# Attachment H

# Reduced Monitoring Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
*Blue Ridge Regional Office*

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Justification for Reduced Monitoring Frequency
Reissuance of VPDES Permit No. VA0003026; GP Big Island, LLC

TO: Permit File

FROM: Becky L. France, Water Permit Writer

DATE: October 21, 2014 (Revised 1/21/15, 1/27/15)

Compliance History

The VPDES Permit Manual recommends effluent monitoring frequencies. Guidance Memo 98-2005 allows for reduced monitoring at facilities with excellent compliance histories. For this reissuance, the eligibility for reduced monitoring has been evaluated.

To qualify for consideration of reduced monitoring, the facility should not have been issued any Notice of Violation (NOV), Warning Letter, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. GP Big Island has not received any warning letters, NOV letters, or other enforcement actions. Therefore, based upon a review of the files, it is believed that this facility has an exemplary operation and shall therefore qualify for a reduced monitoring evaluation of the data submitted on the Discharge Monitoring Reports (DMRs).

Monitoring Data Evaluation

For parameters with semiannual monitoring for outfall 301 (pH, biological oxygen demand ($BOD_5$) and total suspended solids (TSS)), data were evaluated from December 2010 through June 2014. The data evaluation began following the last reduced monitoring review in the 2010 Fact Sheet. For all other parameters and outfalls, DMR data from October 2011 through September 2014 were reviewed and tabulated in the attached tables. Temperature, pH, color rise, total suspended solids (TSS), and biochemical oxygen demand ($BOD_5$) have been considered for reduced monitoring. The actual performance to permit limit ratios are summarized in the tables that follows. Facilities with baseline monitoring that have an actual performance to permit limit ratio of greater than 75 percent are not eligible for reduced monitoring.

Table 1 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 999 (Calculated Limits)**

| Parameter | Actual Performance/ Permit Limit Maximum | Average Performance/ Permit Limit (Maximum) | 2010-2015 Permit Frequency | 2015-2020 Reduced Monitoring |
|---|---|---|---|---|
| Color Rise | 19% | -- | 1/Month | 1/Month |
| $BOD_5$ | 25% | 17% | 1/Month | 1/Month |

Outfall 999 = calculated values from outfalls 002 and 003

*For the reissuance outfall 001 is being eliminated. Therefore, the heat rejected will be reported for outfall 002 rather than outfall 999.

Since these limits were calculated from monitoring data collected from outfalls 002 and 003, the monitoring frequencies for the individual outfalls are evaluated. Outfall 002 consists of cooling water. The reduced monitoring evaluations of outfalls 002 and 003 are based upon the evaluation of the performance values given in the above table.

Table 2 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 002**

| Parameter | Actual Performance/ Permit Limit Monthly Average | Actual Performance/ Permit Limit (Maximum) | 2010-2015 Permit Frequency | 2015-2020 Reduced Monitoring |
|---|---|---|---|---|
| Color | (see calculated color limit associated with outfall 999) | | 1/Week | 1/Week |
| Temperature | (see calculated heat rejected limit associated with outfall 999) | | 2 Days/ Week | 2 Days /Week |
| $BOD_5$ | (see calculated $BOD_5$ limit associated with outfall 999) | | 1/Week | 1/Week |

Table 2 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 002 (Continued)**

| Parameter | Actual Performance/ Permit Limit Monthly Average | Actual Performance/ Permit Limit (Maximum) | 2010 - 2015 Permit Frequency | 2015-2020 Reduced Monitoring |
|---|---|---|---|---|
| $BOD_5$ (intake) | (see calculated $BOD_5$ limit associated with outfall 999) | | 1/Week | 1/ Week |

pH: For outfall 002, several of the monthly pH values were within 0.5 S.U. of the limit. Therefore, this facility's outfall 002 does not qualify for a reduction in pH monitoring frequency.

Color: A limit for color is a calculated value from monitoring of outfalls 002 and 003. For this reissuance outfall 001 has been eliminated. The limit from these two outfalls is given in outfall 999. The DMR data for outfall 999 are consistently well below the permit limit. The actual performance to permit limit ratio is summarized in Table 1. According to Guidance Memo 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. So, outfall 002 color monitoring frequency shall continue to be reduced from 5 days/week to 1/week.

Temperature/ Heat Rejected Limit: Temperature was measured for outfalls 001 and 002 to calculate the heat rejected limit for outfall 999. For the reissuance outfall 001 has been eliminated. The heat rejected limit data for outfall 999 are consistently well below the permit limits. The actual performance to permit limit ratio is summarized in Table 1. According to Guidance Memo 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of between 49 and 25 percent are eligible for a reduced monitoring frequency of 2 days/week. The outfall 002 temperature monitoring frequency shall continue to be reduced from 5 days/week to 2 days/week.

$BOD_5$, $BOD_5$ (intake): A limit for $BOD_5$ is given as a calculated value from monitoring of outfalls 002 and 003. The $BOD_5$ limit for these two outfalls is given in outfall 999. The $BOD_5$ limit monitoring data for outfall 999 are consistently well below the permit limits. The actual performance to permit limit ratios for outfall 999 are summarized in Table 1. According to Guidance Memo 98-2005, facilities with 1/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/ 2 months. However, outfall 003 is not eligible for a reduced monitoring frequency less than 1/week as discussed below. Since the limit given in outfall 999 is based upon monitoring results from outfalls 002 and 003, the $BOD_5$ monitoring frequency for outfall 002 will continue to be monitored 1/week.

Table 3 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 003**

| Parameter | Actual Performance/ Permit Limit Monthly Average* | Actual Performance/ Permit Limit (Maximum)* | 2010-2015 Permit Frequency | 2015-2020 Reduced Monitoring |
|---|---|---|---|---|
| $BOD_5$ | --/12.2% | --/10.5% | 1/Week | 1/Week |
| Total Suspended Solids | --/5.17% | --/4.18% | 1/Week | 1/Week |
| pH | | | 5 Days/Week | 5 Days/Week |
| Color | (see calculated color rise limit associated with outfall 999) | | 1/Week | 1/Week |

*The ratio based upon concentration is listed first, and the ratio based upon loading is listed second.

pH: None of the pH values were within 0.5 S.U. of the limit. However, since the wastewater's pH may be adjusted to improve settling in the primary clarifier, a reduction in monitoring frequency is not appropriate. The VPDES Permit Manual recommends a baseline monitoring frequency of 5 days/week, and this frequency will continue.

$BOD_5$: The $BOD_5$ limit monitoring data for outfall 003 are consistently well below the permit limits. The actual performance to permit limit ratios are summarized in Table 3. According to Guidance Memo 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. So, the outfall 003 $BOD_5$ monitoring frequency shall continue to be reduced from 5 days/week to 1/week.

TSS: The DMR data for outfall 003 are consistently well below the permit limits. The actual performance to permit limit ratios are summarized in Table 3. According to Guidance Memo 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. The outfall 003 monitoring frequency for TSS shall continue to be reduced from 5 days/week to 1/week.

Color: A limit for color rise was calculated from monitoring of outfalls 001, 002, and 003. The limit from these three outfalls was given in outfall 999. The DMR data for outfall 999 are consistently well below the permit limit. The actual performance to permit limit ratio is summarized in Table 1. According to Guidance Memo 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. So, the outfall 003 monitoring frequency for color will continue to be reduced from 5 days/week to 1/week.

Table 4 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 301**

| Parameter | Actual Performance/ Permit Limit Monthly Average* | Actual Performance/ Permit Limit (Maximum)* | 2010-2015 Permit Frequency | 2015-2020 Reduced Monitoring |
|---|---|---|---|---|
| $BOD_5$ | 24% / 2% | 16%/ 1.3% | 1/ 6 Months | 1/ 6 Months |
| TSS | 25% / 2% | 17%/ 1% | 1/ 6 Months | 1/Quarter |

*The ratio based upon concentration is listed first, and the ratio based upon loading is listed second.

pH : Many of the monthly pH values were within 0.5 S.U. of the limit. Therefore, this facility's outfall 301 does not qualifies for a reduction in pH monitoring frequency.

$BOD_5$: All of the DMR data for outfall 301 are well below the permit limits. According to Guidance Memo 98-2005, facilities with 1/month baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/6 months. Therefore, the outfall 301 monitoring frequency for $BOD_5$ shall continue to be reduced from 1/month to 1/6 months.

TSS: All the DMR data for outfall 301 are well below the permit limits. According to Guidance Memo 98-2005, facilities with 1/month baseline monitoring that have an actual performance to permit limit ratio of between 49 and 25 percent are eligible for a reduced monitoring frequency of 1/quarter. Therefore, the outfall 301 monitoring frequency for TSS has been reduced from the baseline 1/month to 1/quarter.

The permit will contain a special condition that will revert the reduced monitoring frequencies for outfalls 002 and 003 back to the baseline frequencies if a Notice of Violation is issued for any of the parameters with reduced monitoring. The permittee is still expected to take all appropriate measures to control both the average and maximum concentrations of the pollutants of concern, regardless of any reductions in monitoring frequencies.

Table 5 **DMR Data for GP Big Island (Outfall 002)**

| Month Due | Flow (MGD) | pH | | | |
|---|---|---|---|---|---|
| | | min S.U. | H ion conc | max S.U. | H ion conc |
| 10-Nov-11 | 3.56 | 8.1 | 7.943E-09 | 8.7 | 1.995E-09 |
| 10-Dec-11 | 3.77 | 8.2 | 6.310E-09 | 8.7 | 1.995E-09 |
| 10-Jan-12 | 5.87 | 7.7 | 1.995E-08 | 8.7 | 1.995E-09 |
| 10-Feb-12 | 7.88 | 7.7 | 1.995E-08 | 8.5 | 3.162E-09 |
| 10-Mar-12 | 6.79 | 7.9 | 1.259E-08 | 8.9 | 1.259E-09 |
| 10-Apr-12 | 4.81 | 7.8 | 1.585E-08 | 8.8 | 1.585E-09 |
| 10-May-12 | 3.87 | 7.8 | 1.585E-08 | 8.7 | 1.995E-09 |
| 10-Jun-12 | 5.62 | 7.8 | 1.585E-08 | 8.4 | 3.981E-09 |
| 10-Jul-12 | 6.51 | 7.7 | 1.995E-08 | 8.8 | 1.585E-09 |
| 10-Aug-12 | 5.02 | 8.2 | 6.310E-09 | 8.7 | 1.995E-09 |
| 10-Sep-12 | 4.84 | 7.8 | 1.585E-08 | 8.7 | 1.995E-09 |
| 10-Oct-12 | 6.28 | 8.3 | 5.012E-09 | 8.8 | 1.585E-09 |
| 10-Nov-12 | 7.14 | 8 | 1.000E-08 | 8.9 | 1.259E-09 |
| 10-Dec-12 | 6.3 | 8.4 | 3.981E-09 | 8.8 | 1.585E-09 |
| 10-Jan-13 | 4.05 | 8.3 | 5.012E-09 | 8.7 | 1.995E-09 |
| 10-Feb-13 | 4.88 | 8.3 | 5.012E-09 | 8.8 | 1.585E-09 |
| 10-Mar-13 | 4.44 | 7.9 | 1.259E-08 | 8.4 | 3.981E-09 |
| 10-Apr-13 | 3.3 | 7.4 | 3.981E-08 | 8.1 | 7.943E-09 |
| 10-May-13 | 3.45 | 7.7 | 1.995E-08 | 8.1 | 7.943E-09 |
| 10-Jun-13 | 3.23 | 7.8 | 1.585E-08 | 8.6 | 2.512E-09 |
| 10-Jul-13 | 4.72 | 8 | 1.000E-08 | 8.3 | 5.012E-09 |
| 10-Aug-13 | 5.21 | 7.9 | 1.259E-08 | 8.3 | 5.012E-09 |
| 10-Sep-13 | 5.5 | 8 | 1.000E-08 | 8.3 | 5.012E-09 |
| 10-Oct-13 | 6.13 | 7.8 | 1.585E-08 | 8.3 | 5.012E-09 |
| 10-Nov-13 | 5.34 | 8 | 1.000E-08 | 8.3 | 5.012E-09 |
| 10-Dec-13 | 5.03 | 7.7 | 1.995E-08 | 8.3 | 5.012E-09 |
| 10-Jan-14 | 5.06 | 7.8 | 1.585E-08 | 8.2 | 6.310E-09 |
| 10-Feb-14 | 4.15 | 7.9 | 1.259E-08 | 8.2 | 6.310E-09 |
| 10-Mar-14 | 6.15 | 7 | 1.000E-07 | 8.1 | 7.943E-09 |
| 10-Apr-14 | 4.73 | 7.7 | 1.995E-08 | 8 | 1.000E-08 |
| 10-May-14 | 2.61 | 7.5 | 3.162E-08 | 8.2 | 6.310E-09 |
| 10-Jun-14 | 3.91 | 7.3 | 5.012E-08 | 8.4 | 3.981E-09 |
| 10-Jul-14 | 4.08 | 7.9 | 1.259E-08 | 8.5 | 3.162E-09 |
| 10-Aug-14 | 4.16 | 8 | 1.000E-08 | 8.3 | 5.012E-09 |
| 10-Sep-14 | 4.03 | 7.9 | 1.259E-08 | 8.3 | 5.012E-09 |
| 10-Oct-14 | 3.72 | 8 | 1.000E-08 | 8.3 | 5.012E-09 |
| mean | 5 | 7.8 | 1.743E-08 | 8.4 | 3.974E-09 |
| maximum | 7.88 | | | 8.9 | |
| minimum | 2.61 | 7.0 | | | |
| permit limit | | 6.0 | | 9.0 | |

Table 6 **DMR Data for GP Big Island (Outfall 003)**

| Month Due | Flow | pH | | | | TSS | | | | $BOD_5$ | | Temp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | min S.U. | H ion conc | max S.U. | H ion conc | average kg/d | max kg/d | average mg/L | max mg/L | average kg/d | max kg/d | °C |
| 10-Nov-11 | 7.09 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 181 | 310 | 7 | 13 | 185 | 286 | 24 |
| 10-Dec-11 | 7.77 | 7.2 | 6.310E-08 | 7.2 | 6.310E-08 | 203 | 358 | 7 | 13 | 214 | 335 | 20 |
| 10-Jan-12 | 7.94 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 226 | 402 | 7 | 10 | 224 | 452 | 20 |
| 10-Feb-12 | 7.1 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 260 | 512 | 10 | 20 | 167 | 348 | 17 |
| 10-Mar-12 | 7.11 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 172 | 253 | 6 | 9 | 181 | 263 | 18 |
| 10-Apr-12 | 7.67 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 151 | 240 | 5 | 9 | 207 | 294 | 25 |
| 10-May-12 | 7.58 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 177 | 279 | 6 | 10 | 195 | 304 | 23 |
| 10-Jun-12 | 8.25 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 135 | 169 | 4 | 6 | 170 | 207 | 28 |
| 10-Jul-12 | 8.25 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 162 | 289 | 5 | 9 | 161 | 289 | 29 |
| 10-Aug-12 | 8.08 | 7.3 | 5.012E-08 | 7.3 | 5.012E-08 | 103 | 160 | 3 | 5 | 166 | 243 | 30 |
| 10-Sep-12 | 8.07 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 183 | 371 | 6 | 12 | 217 | 402 | 28 |
| 10-Oct-12 | 7.79 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 174 | 290 | 6 | 10 | 246 | 505 | 27 |
| 10-Nov-12 | 7.56 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 186 | 376 | 6 | 12 | 210 | 378 | 23 |
| 10-Dec-12 | 7.71 | 7.2 | 6.310E-08 | 7.2 | 6.310E-08 | 558 | 813 | 19 | 27 | 393 | 648 | 18 |
| 10-Jan-13 | 7.67 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 366 | 580 | 13 | 18 | 320 | 534 | 19 |
| 10-Feb-13 | 7.93 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 457 | 641 | 15 | 20 | 252 | 360 | 20 |
| 10-Mar-13 | 7.72 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 532 | 666 | 19 | 24 | 308 | 507 | 14 |
| 10-Apr-13 | 8.04 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 438 | 555 | 14 | 18 | 316 | 493 | 18 |
| 10-May-13 | 7.84 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 328 | 383 | 11 | 13 | 282 | 520 | 25 |
| 10-Jun-13 | 8.65 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 366 | 449 | 12 | 14 | 267 | 345 | 30 |
| 10-Jul-13 | 8.4 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 339 | 598 | 10 | 13 | 310 | 552 | 29 |
| 10-Aug-13 | 8.7 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 315 | 362 | 10 | 12 | 232 | 354 | 32 |
| 10-Sep-13 | 8.34 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 306 | 382 | 9 | 11 | 244 | 355 | 30 |
| 10-Oct-13 | 8.17 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 291 | 367 | 10 | 12 | 260 | 367 | 29 |
| 10-Nov-13 | 8.22 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 438 | 1116 | 14 | 33 | 310 | 748 | 26 |
| 10-Dec-13 | 8.37 | 7.4 | 3.981E-08 | 7.4 | 3.981E-08 | 566 | 1154 | 17 | 36 | 355 | 556 | 20 |
| 10-Jan-14 | 8.43 | 7.5 | 3.162E-08 | 7.5 | 3.162E-08 | 348 | 745 | 11 | 23 | 297 | 583 | 19 |
| 10-Feb-14 | 8.01 | 7.6 | 2.512E-08 | 7.6 | 2.512E-08 | 435 | 616 | 14 | 21 | 314 | 763 | 14 |
| 10-Mar-14 | 8.31 | 6.8 | 1.585E-07 | 6.8 | 1.585E-07 | 434 | 671 | 14 | 22 | 327 | 488 | 14 |
| 10-Apr-14 | 8.44 | 7.4 | 3.981E-08 | 7.4 | 3.981E-08 | 416 | 801 | 13 | 23 | 303 | 592 | 16 |
| 10-May-14 | 8.21 | 7.4 | 3.981E-08 | 7.4 | 3.981E-08 | 327 | 533 | 11 | 16 | 295 | 400 | 22 |
| 10-Jun-14 | 8.62 | 7.1 | 7.943E-08 | 7.1 | 7.943E-08 | 340 | 507 | 10 | 14 | 279 | 344 | 28 |
| 10-Jul-14 | 8.91 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 171 | 359 | 5 | 10 | 228 | 342 | 30 |
| 10-Aug-14 | 8.68 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 228 | 287 | 7 | 8 | 217 | 311 | 31 |
| 10-Sep-14 | 8.74 | 7.8 | 1.585E-08 | 7.8 | 1.585E-08 | 344 | 469 | 10 | 16 | 329 | 818 | 30 |
| 10-Oct-14 | 8.07 | 7.7 | 1.995E-08 | 7.7 | 1.995E-08 | 216 | 328 | 7 | 11 | 258 | 566 | 30 |
| mean | 8.07 | 7.5 | 3.458E-08 | | 3.458E-08 | 302.0 | 483.1 | 10 | 15 | 257 | 440 | 24 |
| maximum | 8.91 | | | 7.8 | | 566 | 1154 | 19 | 36 | 393 | 818 | 32 |
| minimum | 7.09 | 6.8 | | | | 103.0 | 160 | 3 | 5 | 161 | 207 | 14 |
| permit limit | | 6.0 | | 9.0 | | 6212 | 12274 | | | 2105 | 4210 | |
| (mean performance / permit limit) * 100 | | | | | | 4.9 | 3.9 | | | 12.2 | 10.5 | |

Table 7 **DMR Data for GP Big Island (Outfall 301)**

| Month Due | TSS | | | | $BOD_5$ | | | |
|---|---|---|---|---|---|---|---|---|
| | average kg/d | max kg/d | average mg/L | max mg/L | average kg/d | max kg/d | average mg/L | max mg/L |
| 10-Jan-10 | 0.1 | 0.1 | 8 | 8 | 0.1 | 0.1 | 5 | 5 |
| 10-Feb-10 | 0.1 | 0.1 | 8 | 8 | 0.2 | 0.2 | 10 | 10 |
| 10-Mar-10 | 0.3 | 0.3 | 8 | 8 | 0.4 | 0.4 | 12 | 12 |
| 10-Apr-10 | 0.2 | 0.2 | 8 | 8 | 0.3 | 0.3 | 15 | 15 |
| 10-May-10 | 0.1 | 0.1 | 6 | 6 | <QL | <QL | <QL | <QL |
| 10-Jun-10 | 0.2 | 0.2 | 8 | 8 | 0.2 | 0.2 | 8 | 8 |
| 10-Jul-10 | 0.1 | 0.1 | 6 | 6 | 0.2 | 0.2 | 10 | 10 |
| 10-Jan-11 | 76 | 76 | 5 | 5 | <QL | <QL | <QL | <QL |
| 10-Jul-11 | 165 | 165 | 13 | 13 | 98 | 98 | 8 | 8 |
| 10-Jan-12 | 138 | 138 | 5 | 5 | 165 | 165 | 6 | 6 |
| 10-Jul-12 | 28 | 30 | 3 | 4 | 91 | 91 | 7 | 7 |
| 10-Jan-13 | 117 | 117 | 15 | 15 | 70 | 70 | 9 | 9 |
| 10-Jul-13 | 159 | 159 | 10 | 10 | 127 | 127 | 8 | 8 |
| 10-Jan-14 | 636 | 636 | 9 | 9 | 778 | 778 | 11 | 11 |
| 10-Jul-14 | 13 | 13 | 2 | 2 | <QL | <QL | <QL | <QL |
| mean | 88.9 | 89.0 | 7.6 | 8 | 89 | 89 | 7 | 7 |
| maximum | 636 | 636 | 15 | 15 | 778 | 778 | 12 | 12 |
| minimum | 0.1 | 0.1 | 2 | | 0 | 0 | 0 | 0 |
| permit limit | 4500 | 6800 | *30* | *45* | 4500 | 6800 | *30* | *45* |
| (mean performance / permit limit) * 100 | 2 | 1 | 25 | 17 | 2 | 1.3 | 24 | 16 |

Table 8 **DMR Data for GP Big Island (Outfall 999)**

| Month Due | Color Rise (PCU) | Heat Rejected BTU/hr | $BOD_5$ | |
|---|---|---|---|---|
| | | | average kg/d | max kg/d |
| 10-Nov-11 | 10 | 14.2 | 246 | 465 |
| 10-Dec-11 | 6 | 20.6 | 298 | 593 |
| 10-Jan-12 | 9 | 9.1 | 301 | 787 |
| 10-Feb-12 | 6 | 16.7 | 369 | 860 |
| 10-Mar-12 | 7 | 15.3 | 305 | 762 |
| 10-Apr-12 | 5 | 38 | 219 | 633 |
| 10-May-12 | 9 | 17.8 | 188 | 830 |
| 10-Jun-12 | 29 | 18.4 | 285 | 937 |
| 10-Jul-12 | 21 | 12.5 | 257 | 836 |
| 10-Aug-12 | 16 | 15.8 | 256 | 600 |
| 10-Sep-12 | 21 | 18.5 | 351 | 648 |
| 10-Oct-12 | 21 | 21.6 | 506 | 1152 |
| 10-Nov-12 | 14 | 17.3 | 497 | 1078 |
| 10-Dec-12 | 14 | 22.1 | 523 | 1900 |
| 10-Jan-13 | 10 | 25.4 | 444 | 1358 |
| 10-Feb-13 | 8 | 19.5 | 365 | 1129 |
| 10-Mar-13 | 8 | 16.8 | 315 | 898 |
| 10-Apr-13 | 6 | 20.5 | 329 | 980 |
| 10-May-13 | 16 | 17 | 305 | 987 |
| 10-Jun-13 | 19 | 19.8 | 354 | 809 |
| 10-Jul-13 | 26 | 27.5 | 408 | 955 |
| 10-Aug-13 | 15 | 16.1 | 254 | 587 |
| 10-Sep-13 | 37 | 18.5 | 242 | 641 |
| 10-Oct-13 | 21 | 19.3 | 523 | 1026 |
| 10-Nov-13 | 14 | 17.6 | 354 | 1293 |
| 10-Dec-13 | 4 | 24.3 | 501 | 1268 |
| 10-Jan-14 | 6 | 20.4 | 462 | 852 |
| 10-Feb-14 | 5 | 18.1 | 177 | 434 |
| 10-Mar-14 | 3 | 12 | 271 | 890 |
| 10-Apr-14 | 3 | 14 | 362 | 2376 |
| 10-May-14 | 14 | 9.2 | 314 | 903 |
| 10-Jun-14 | 16 | 20.6 | 738 | 2299 |
| 10-Jul-14 | 19 | 6.8 | 410 | 1131 |
| 10-Aug-14 | 22 | 26.7 | 241 | 719 |
| 10-Sep-14 | 19 | 12.8 | 385 | 1233 |
| 10-Oct-14 | 11 | 10 | 721 | 2822 |
| mean | 14 | 18 | 363 | 1046 |
| maximum | 37 | 38 | 738 | 2822 |
| minimum | 3 | 6.8 | 177 | 434 |
| permit limit | 70 | 67.2 | 2105 | 4210 |
| (mean performance / permit limit) * 100 | 19 | 27 | 17 | 25 |

# Attachment I

## Mixing Zones

- **Mixing Zone Calculations (MIXER 2.1) (Outfall 002)**
- **Diffuser Calculations (Outfall 003)**
- **Thermal Mixing Zone Study (Excerpt)**
- **Mixing Zone Diffuser Study Plan and Conditional Approval Letter**
- **Mixing Zone Diffuser Study Approval Letter**

# Mixing Zone Predictions for GP Big Island (Outfall 002)

Effluent Flow = 6.15 MGD
Stream 7Q10 = 254 MGD
Stream 30Q10 = 293 MGD
Stream 1Q10 = 199 MGD
Stream slope = 0.00065 ft/ft
Stream width = 427 ft
Bottom scale = 1
Channel scale = 1

---

Mixing Zone Predictions @ 7Q10

Depth = 1.1409 ft
Length = 341935.83 ft
Velocity = .8266 ft/sec
Residence Time = 4.7877 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 41.77% of the 7Q10 is used.

---

Mixing Zone Predictions @ 30Q10

Depth = 1.2409 ft
Length = 318720.95 ft
Velocity = .874 ft/sec
Residence Time = 4.2209 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 47.38% of the 30Q10 is used.

---

Mixing Zone Predictions @ 1Q10

Depth = .9891 ft
Length = 385325.4 ft
Velocity = .7519 ft/sec
Residence Time = 142.3508 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than .7% of the 1Q10 is used.

---

Georgia-Pacific Corporation
Hwy. 501 North
P.O. Box 40
Big Island, Virginia 24526
Telephone (804) 299-5911

September 13, 1994 VA0003026



IND
NAO —
OWRM —

Thermal Mixing Zone Study

Mr. Neil Obenshain
Department of Environmental Quality
Water Division
West Central Regional Office
3015 Peters Creek Road
P. O. Box 7017
Roanoke, VA 24019-7017

Dear Mr. Obenshain:

Thank you again for meeting with Al Beshire and me on September 2nd. We are excited about the possibility of a new paper machine at the Big Island Mill. As I stated during our meeting, we should know in October if the project will proceed. We are encouraged to know that DEQ staff would be available to review a permit modification application in November. You indicated that the DEQ will proceed with reissuance of the existing permit and expects to have the permit reissued by November 30, 1994.

During our meeting we discussed how thermal mixing zones for Outfalls 001, 002 and 003 would be incorporated into the reissued permit. You indicated that the physical size of the mixing zones will be listed in the permit fact sheets. A thermal limit will be contained in the permit.

As we discussed, I have tabulated the maximum thermal discharges recorded for the period January 1992 through August 1994. Please note that the temperature values recorded for Outfalls 002 and 003 and the river are instantaneous readings. The value recorded for Outfall 001 is the average value from a continuous temperature probe. The three tables and the summary table (Table 5) from the Thermal Mixing Zone Study Report dated February 10, 1993 are enclosed. The maximum values are comparable to the study conditions.

After further consideration we still consider it appropriate to use the maximum thermal capacity of the equipment serviced by Outfalls 001 and 002 in calculating the size of the mixing zone. However, we are agreeable to modeling the maximum $\Delta$ MM BTU/HR value recorded over the last three years plus 10 percent at the critical river flow (7Q10) to project the size of the mixing zone to be listed in the permit.

With regard to a permit limit, we believe a $\Delta$ MM BTU/HR limit is most appropriate taking into account the variability of the flow rate and temperature of both the James River and Outfalls. Again we recommend the maximum recorded value plus ten percent.

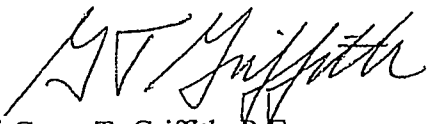
As we have advised you, G-P is studying the expansion of the Big Island facility. As a result of the expansion, the mixing zones for temperature may need to be made larger. We understand that your office would prefer to do this after the next permit is issued by modifying the permit. We request that the following language be inserted in our permit to make it clear that we will be entitled to a larger mixing zone:

> This permit may be reopened to provide for a different mixing zone for temperature. Modification of the permit is subject to the provisions of 40 C.F.R. S 122.62 or Virginia equivalent. Virginia has determined that such an adjustment in the mixing zone, even if made larger, would be consistent with and authorized by the provisions of the Clean Water Act.

In addition, we indicated that the hydrogeological study of the wastewater treatment lagoons is nearly complete. The data indicates that the contribution of the lagoons is less than 5 Kg/D BOD. We expect that this report will be completed and submitted to the Department the week of September 12th.

We look forward to receipt of the draft permit shortly. We will advise you of any comments on the draft. We will also keep you advised on the status of our expansion study.

Very truly yours,



Garry T. Griffith, P.E.
Environmental Manager

GTG/sb

Enclosures

cc: R. T. Allen - Atlanta GA030 11
A. W. Beshire - Atlanta GA030 48
U. E. Johnson - Atlanta GA030 48
J. W. Kertis
C. R. Judy
J. S. Johnson
GTG235.DOC

Thermal Mixing Zone Study

MAXIMUM THERMAL DISCHARGE DATA
1992 - 1994 (YTD)

OUTFALL 001

| | EFFLUENT | | RIVER | | △ MM BTU/HR. |
|---|---|---|---|---|---|
| WINTER * | FLOW (MGD) | TEMP. ( ° C) | FLOW (MGD) | TEMP. ( ° C) | |
| 1992 | 1.2 | 25.7 | 21,731 | 12.6 | 9.8 |
| 1993 | 1.3 | 25.8 | 20,000 | 10.2 | 12.7 |
| 1994 (YTD AVG.) | 1.1 | 26.2 | 11,119 | 13.3 | 8.8 |
| SUMMER ** | FLOW (MGD) | TEMP. ( ° C) | FLOW (MGD) | TEMP. ( ° C) | |
| 1992 | 1.02 | 33.2 | 710 | 17.9 | 9.7 |
| 1993 | 0.47 | 45.6 | 679 | 24.4 | 6.2 |
| 1994 (YTD AVG.) | 0.58 | 46.0 | 1,195 | 25.5 | 7.1 |

remove

* WINTER = DECEMBER - MARCH
** SUMMER = MAY - SEPTEMBER

$(12.7)(0.10) = 1.27$

12.7
1.27
13.97

MAXIMUM THERMAL DISCHARGE DATA
1992 - 1994 (YTD)

OUTFALL 002

| | EFFLUENT | | RIVER | | Δ MM BTU/HR. |
|---|---|---|---|---|---|
| WINTER * | FLOW (MGD) | TEMP. ( ° C) | FLOW (MGD) | TEMP. ( ° C) | |
| 1992 | 6.3 | 21.7 | 2,851 | 9.4 | 48.5 |
| 1993 | 6.0 | 18.4 | 590 | 5.8 | 47.3 |
| 1994 (YTD AVG.) | 5.1 | 18.4 | 1,453 | 8.0 | 33.2 |
| SUMMER ** | FLOW (MGD) | TEMP. ( ° C) | FLOW (MGD) | TEMP. ( ° C) | |
| 1992 | 6.3 | 25.6 | 4,921 | 18.1 | 29.6 |
| 1993 | 5.3 | 27.6 | 404 | 22.3 | 17.6 |
| 1994 (YTD AVG.) | 4.8 | 28.6 | 757 | 22.9 | 17.1 |

* WINTER = DECEMBER - MARCH
** SUMMER = MAY - SEPTEMBER

48.5 (0.10) = 4.85
48.5
53.35
outfall 002

MAXIMUM THERMAL DISCHARGE DATA
1992 - 1994 (YTD)

OUTFALL 003

| | EFFLUENT | | RIVER | | Δ MM BTU/HR. |
|---|---|---|---|---|---|
| WINTER * | FLOW (MGD) | TEMP. ( ° C) | FLOW (MGD) | TEMP. ( ° C) | |
| 1992 | 5.7 | 19.3 | 3,158 | 10.8 | 30.3 |
| 1993 | 6.3 | 16.8 | 20,447 | 10.7 | 24.0 |
| 1994 (YTD AVG.) | 7.1 | 17.3 | 13,558 | 12.6 | 20.9 |
| SUMMER ** | FLOW (MGD) | TEMP. ( ° C) | FLOW (MGD) | TEMP. ( ° C) | |
| 1992 | 5.1 | 31.2 | 695 | 19.6 | 37.0 |
| 1993 | 6.1 | 33.1 | 800 | 24.8 | 31.7 |
| 1994 (YTD AVG.) | 7.1 | 26.8 | 1,069 | 22.2 | 20.4 |

* WINTER = DECEMBER - MARCH
** SUMMER = MAY - SEPTEMBER

TABLE 5

THERMAL DISCHARGE DATA SUMMARY

| OUTFALL | SEASON | EFFLUENT | | RIVER | | Δ MMBTU/HR[1] | ISOTHERM VOLUME | | |
|---|---|---|---|---|---|---|---|---|---|
| | | FLOW (MGD) | TEMP. (°C) | FLOW (MGD) | TEMP (°C) | | ≥+1°C | ≥+2°C | ≥+3°C |
| 001 | Winter | 0.10 | 21 | 2,862 | 5 | 1.00 | 198 | 0 | 0 |
| | Spring | 0.27 | 31 | 2,025 | 20 | 1.86 | 52 | 50 | 40 |
| | Summer | 1.19 | 34 | 552 | 25 | 6.70 | 21,277 | 2,217 | 1,456 |
| | Fall | 0.14 | 31 | 581 | 15 | 1.40 | 1,372 | 1,067 | 1,034 |
| 002 | Winter | 6.6 | 14 | 2,862 | 5 | 37.2 | 5,678 | 2,283 | 635 |
| | Spring | 6.1 | 26 | 2,025 | 20 | 22.9 | 3,822 | 707 | 191 |
| | Summer | 5.9 | 31 | 552 | 26 | 18.5 | 18,927 | 7,783 | 2,700 |
| | Fall | 6.4 | 24 | 581 | 15 | 36.0 | 23,570 | 14,479 | 5,652 |
| 003 | Winter | 4.7 | 15 | 2,862 | 5 | 24.4 | 35,455[2] | 6,172[2] | 1,500 |
| | Spring | 5.8 | 26 | 2,025 | 21 | 18.1 | 747 | 384 | 223 |
| | Summer | 5.9 | 30 | 552 | 27 | 11.1 | 6,231 | 384 | 62 |
| | Fall | 5.7 | 24 | 581 | 17 | 25.0 | 12,394 | 1,798 | 842 |

Notes:

1. ΔMMBTU/HR (or change in effluent heat in million BTUs per hour) = [(Effluent flow in MGD) x 0.3475] x [(Effluent Temp. in °C) - (River Temp. in °C)] x 1.8.
2. Actual values are higher due to inability to measure depths greater than 8 feet.

Job Number 31367

February 10, 1993

Alamance Mixing Zone Study

feeders and other nonmobile organisms, spatial distribution of organisms and reinforcement of weakened populations are enhanced, and embryos and larvae of some fish species develop while drifting [11]. Anadromous and catadromous species must be able to reach suitable spawning areas. Their young (and in some cases the adults) must be assured a return route to their growing and living areas. Many species make migrations for spawning and other purposes. Barriers or blocks that prevent or interfere with these types of essential transport and movement can be created by water with inadequate chemical or physical quality.

As explained above, a State regulatory agency may decide to deny a mixing zone in a site-specific case. For example, denial should be considered when bioaccumulative pollutants are in the discharge. The potential for a pollutant to bioaccumulate in living organisms is measured by (1) the bioconcentration factor (BCF), which is chemical-specific and describes the degree to which an organism or tissue can acquire a higher contaminant concentration than its environment (e.g., surface water); (2) the duration of exposure; and (3) the concentration of the chemical of interest. While any BCF value greater than 1 indicates that bioaccumulation potential exists, bioaccumulation potential is generally not considered to be significant unless the BCF exceeds 100 or more. Thus, a chemical that is discharged to a receiving stream, resulting in low concentrations, and that has a low BCF value will not create a bioaccumulation hazard. Conversely, a chemical that is discharged to a receiving stream, resulting in a low concentration but having a high BCF value, may cause in a bioaccumulation hazard. Also, some chemicals of relatively low toxicity, such as zinc, will bioconcentrate in fish without harmful effects resulting from human consumption.

Another example of when a regulator should consider prohibiting a mixing zone is in situations where an effluent is known to attract biota. In such cases, provision of a continuous zone of passage around the mixing area will not serve the purpose of protecting aquatic life. A review of the technical literature on avoidance/attraction behavior revealed that the majority of toxicants elicited an avoidance or neutral response at low concentrations [13]. However, some chemicals did elicit an attractive response, but the data were not sufficient to support any predictive methods. Temperature can be an attractive force and may counter an avoidance response to a pollutant, resulting in attraction to the toxicant discharge. Innate behavior such as migration may also supersede an avoidance response and cause fish to incur a significant exposure.

### 4.3.2 Minimizing the Size of Mixing Zones

Concentrations above the chronic criteria are likely to prevent sensitive taxa from taking up long-term residence in the mixing zone. In this regard, benthic organisms and territorial organisms are likely to be of greatest concern. The higher the concentrations occurring within an isopleth, the more taxa are likely to be excluded, thereby affecting the structure and function of the ecological community. It is thus important to minimize the overall size of the mixing zone and the size of elevated concentration isopleths within the mixing zone.

### 4.3.3 Prevention of Lethality to Passing Organisms

The *Water Quality Standards Handbook* [14] indicates that whether to establish a mixing zone policy is a matter of State discretion, but that any State policy allowing for mixing zones must be consistent with the CWA and is subject to approval of the Regional Administrator. The handbook provides additional discussion regarding the basis for a State mixing zone policy.

Lethality is a function of the magnitude of pollutant concentrations and the duration an organism is exposed to those concentrations. Requirements for wastewater plumes that tend to attract aquatic life should incorporate measures to reduce the toxicity (e.g., via pretreatment, dilution) to minimize lethality or any irreversible toxic effects on aquatic life.

EPA's water quality criteria provide guidance on the magnitude and duration of pollutant concentrations causing lethality. The criterion maximum concentration (CMC) is used as a means to prevent lethality or other acute effects. As explained in Appendix D, the CMC is a toxicity level and should not be confused with an $LC_{50}$ level. The CMC is defined as one-half of the final acute value for specific toxicants and 0.3 acute toxic unit ($TU_a$) for effluent toxicity (see Chapter 2). The CMC describes the condition under which lethality will not occur if the duration of the exposure to the CMC level is less than 1 hour. The CMC for whole effluent toxicity is intended to prevent lethality or acute effects in the aquatic biota. The CMC for individual toxicants prevents acute effects in all but a small percentage of the tested species. Thus, the areal extent and concentration isopleths of the mixing zone must be such that the 1-hour average exposure of organisms passing through the mixing zone is less than the CMC. The organism must be able to pass through quickly or flee the high-concentration area. The objective of developing water quality recommendations for mixing zones is to provide time-exposure histories that produce negligible or no measurable effects on populations of critical species in the receiving system.

Lethality to passing organisms can be prevented in the mixing zone in one of four ways. The first method is to prohibit concentrations in excess of the CMC in the pipe itself, as measured directly at the end of the pipe. As an example, the CMC should be met in the pipe whenever a continuous discharge is made to an intermittent stream. The second approach is to require that the CMC be met within a very short distance from the outfall during chronic design-flow conditions for receiving waters (see Section 4.4.2).

If the second alternative is selected, hydraulic investigations and calculations indicate that the use of a high-velocity discharge with an initial velocity of 3 meters per second, or more, together with a mixing zone spatial limitation of 50 times the discharge length scale in any direction, should ensure that the CMC is met within a few minutes under practically all conditions. The discharge length scale is defined as the square root of the cross-sectional area of any discharge pipe.

A third alternative (applicable to any waterbody) is not to use a high-velocity discharge. Rather the discharger should provide

data to the State regulatory agency showing that the most restrictive of the following conditions are met for each outfall:

- The CMC should be met within 10 percent of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in any spatial direction.

- The CMC should be met within a distance of 50 times the discharge length scale in any spatial direction. In the case of a multiport diffuser, this requirement must be met for each port using the appropriate discharge length scale of that port. This restriction will ensure a dilution factor of at least 10 within this distance under all possible circumstances, including situations of severe bottom interaction, surface interaction, or lateral merging.

- The CMC should be met within a distance of five times the local water depth in any horizontal direction from any discharge outlet. The local water depth is defined as the natural water depth (existing prior to the installation of the discharge outlet) prevailing under mixing zone design conditions (e.g., low flow for rivers). This restriction will prevent locating the discharge in very shallow environments or very close to shore, which would result in significant surface and bottom concentrations.

A fourth alternative (applicable to any waterbody) is for the discharger to provide data to the State regulatory agency showing that a drifting organism would not be exposed to 1-hour average concentrations exceeding the CMC, or would not receive harmful exposure when evaluated by other valid toxicological analysis, as discussed in Section 2.2.2. Such data should be collected during environmental conditions that replicate critical conditions.

For the third and fourth alternatives, examples of such data include monitoring studies, except for those situations where collecting chemical samples to develop monitoring data would be impractical, such as at deep outfalls in oceans, lakes, or embayments. Other types of data could include field tracer studies using dye, current meters, other tracer materials, or detailed analytical calculations, such as modeling estimations of concentration or dilution isopleths.

The Water Quality Criteria—1972 [11] outlines a method, applicable to the fourth alternative, to determine whether a mixing zone is tolerable for a free-swimming or drifting organism. The method incorporates mortality rates (based on toxicity studies for the pollutant of concern and a representative organism) along with the concentration isopleths of the mixing zone and the length of time the organism may spend in each isopleth. The intent of the method is to prevent the actual time of exposure from exceeding the exposure time required to elicit an effect [10]:

$$\Sigma\left[\frac{T(n)}{ET(X) \text{ at } C(n)}\right] \leq 1$$

where T(n) is the exposure time an organism is in isopleth n, and ET(X) is the "effect time." That is, ET(X) is the exposure time required to produce an effect (including a delayed effect) in X percent of organisms exposed to a concentration equal to C(n), the concentration in isopleth n. ET(X) is experimentally determined; the effect is usually mortality. If the summation of ratios of exposure time to effect time is less than 1, then the percent effect will not occur.

### 4.3.4 Prevention of Bioaccumulation Problems for Human Health

States are not required to allow mixing zones. Where unsafe fish tissue levels or other evidence indicates a lack of assimilative capacity in a particular waterbody for a bioaccumulative pollutant, care should be taken in calculating discharge limits for this pollutant or the additivity of multiple pollutants. In particular, relaxing discharge limits because of the provision of a mixing zone may not be appropriate in this situation.

## 4.4 MIXING ZONE ANALYSES

Proper design of a mixing zone study for a particular waterbody requires estimation of the distance from the outfall to the point where the effluent mixes completely with the receiving water. The boundary is usually defined as the location where the concentrations across a transect of the waterbody differ by less than 5 percent. The boundary can be determined based on the results of a tracer study or the use of mixing zone models. Both procedures, along with simple order-of-magnitude dilution calculations, are discussed in the following subsections.

If the distance to complete mixing is insignificant, then mixing zone modeling is not necessary and the fate and transport models described in Section 4.5 can be used to perform the WLA. It is important to remember that the assumption of complete mixing is not a conservative assumption for toxic discharges; an assumption of minimal mixing is the conservative approach. If completely mixed conditions do not occur within a short distance of the outfall, the WLA study should rely on mixing zone monitoring and modeling. Just as in the case of completely mixed models, mixing zone analysis can be performed using both steady-state and dynamic techniques. State requirements regarding the mixing zone will determine how water quality criteria are used in the TMDL.

This section is divided into five subsections. The first discusses recommendations for outfall designs and means to maximize initial dilution. The second provides a brief description of the four major waterbody types and the critical design period when mixing zone analysis should be performed for each. The third provides a brief description of tracer studies and how they may be used to define a mixing zone. The fourth and fifth subsections discuss simplified methods and sophisticated models to predict the two stages of mixing (i.e., discharge-induced and ambient-induced mixing). For a detailed explanation of the mechanisms involved in estimating both stages of mixing, two references are recommended, Holley and Jirka [15] and Fischer et al. [16]. Although the models presented in Sections 4.4.4 and 4.4.5 simplify the mixing process, the assessor should have an understanding of the basic physical concepts governing mixing to use these

K. The board is not required to conduct a use attainability analysis under this chapter whenever designating uses which include those specified in subsection A of this section.

9 VAC 25-260-20. General criteria.

A. All state waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.

Specific substances to be controlled include, but are not limited to: floating debris, oil, scum, and other floating materials; toxic substances (including those which bioaccumulate); substances that produce color, tastes, turbidity, odors, or settle to form sludge deposits; and substances which nourish undesirable or nuisance aquatic plant life. Effluents which tend to raise the temperature of the receiving water will also be controlled.

B. Mixing zones.

1. The board shall use mixing zone concepts in evaluating permit limits for acute and chronic standards in 9 VAC 25-260-140 B. No mixing zone established by the board shall:

a. Prevent movement of passing or drifting aquatic organisms through the water body in question;

b. Cause acute lethality to passing or drifting aquatic organisms;

c. Be used for, or considered as, a substitute for minimum treatment technology required by the Clean Water Act and other applicable state and federal laws;

d. Constitute more than one half of the width of the receiving watercourse nor constitute more than one third of the area of any cross section of the receiving watercourse;

e. Extend downstream at any time a distance more than five times the width of the receiving watercourse at the point of discharge.

2. An allocated impact zone may be allowed within a mixing zone. This zone is the area of initial dilution of the effluent with the receiving water where the concentration of the effluent will be its greatest in the water column. Mixing within these allocated impact zones shall be as quick as practical and shall be sized to prevent lethality to passing or drifting aquatic organisms.

3. Mixing zones shall be determined such that acute standards are met outside the allocated impact zone and chronic standards are met at the edge of the mixing zone (see 9 VAC 25-260-140 A and B).

4. The board may waive the requirements of subdivisions 1 d and e of this subsection if:

a. The board determines on a case-by-case basis that a complete mix assumption is appropriate; or

b. A discharger provides an acceptable demonstration of:

(1) Information defining the actual boundaries of the mixing zone in question; and

(2) Information and data proving no violation of subdivisions 1 a, b and c of this subsection by the mixing zone in question.

GEORGIA-PACIFIC CORPORATION
BIG ISLAND MILL

# CHEMICAL MIXING ZONE STUDY PLAN



*Prepared for:*

**Georgia-Pacific Corporation**
P.O. Box 40
Big Island, Virginia 24526

OLVER
INCORPORATED

*Prepared by:*

**Olver Incorporated**
**1116 South Main Street, Suite 100**
**Blacksburg, Virginia 24060**

October 17, 2002
Project Number: 11309.17

RMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222
CORNELL MIXING ZONE EXPERT SYSTEM

Subsystem CORMIX2: Subsystem version:
Submerged Multiport Diffuser Discharges CORMIX_v.3.20 September_1996

---

---

CASE DESCRIPTION
Site name/label: Georgia-Pacific^003^Diffuser
Design case: Expected^value^of^ammonia^used^as^Co
FILE NAME: cormix\sim\gp3_798 .cx2 at 7Q10 flow
Time of Fortran run: 07/23/98--13:02:33

ENVIRONMENT PARAMETERS (metric units)
Bounded section
BS = 98.67 AS = 436.12 QA = 12.95 ICHREG= 1
HA = 4.42 HD = 4.45
UA = .030 F = .043 USTAR = .2177E-02
UW = 2.000 UWSTAR= .2198E-02
Uniform density environment
STRCND= U RHOAM = 996.4861

DIFFUSER DISCHARGE PARAMETERS (metric units)
Diffuser type: DITYPE= unidirectional_perpendicular
BANK = RIGHT DISTB = 33.10 YB1 = 23.20 YB2 = 43.00
LD = 19.80 NOPEN = 15 SPAC = 1.41
D0 = .152 A0 = .018 H0 = .30
Nozzle/port arrangement: unidirectional_without_fanning
GAMMA = 90.00 THETA = 30.00 SIGMA = .00 BETA = 90.00
U0 = 2.192 Q0 = .364 = .3640E+00
RHO0 = 995.3405 DRHO0 = .1146E+01 GP0 = .1127E-01
C0 = .2560E+01 CUNITS= ppm
IPOLL = 2 KS = .0000E+00 KD = .6000E-05

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
q0 = .1838E-01 m0 = .4030E-01 j0 = .2073E-03 SIGNJ0= 1.0
Associated 2-d length scales (meters)
lQ=B = .008 lM = 11.48 lm = 45.69
lmp = 99999.00 lbp = 99999.00 la = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
Q0 = .3640E+00 M0 = .7980E+00 J0 = .4104E-02
Associated 3-d length scales (meters)
LQ = .41 LM = 13.18 Lm = 30.08 Lb = 156.64
Lmp = 99999.00 Lbp = 99999.00

NON-DIMENSIONAL PARAMETERS
FR0 = 225.46 FRD0 = 52.95 R = 73.81
(slot) (port/nozzle)

FLOW CLASSIFICATION
22222222222222222222222222222222222
2 Flow class (CORMIX2) = MU2 2
2 Applicable layer depth HS = 4.45 2
22222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
C0 = .2560E+01 CUNITS= ppm
NTOX = 1 CMC = .7231E+00 CCC = CSTD
NSTD = 1 CSTD = .1566E+00

```
 REGMZ =  1
 REGSPC=  3          XREG  =        .00  WREG  =        .00  AREG  =    145.23
 XINT  =   4666.00   XMAX  =    4666.00

:-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
        33.10 m  from the RIGHT bank/shore.
    X-axis points downstream,. Y-axis points to left, Z-axis points upward.
ISTEP = 50 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
3EGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

      X         Y         Z         S         C         BV        BH
     .00       .00       .30      1.0   .256E+01       .01      9.90

:ND OF MOD201: DIFFUSER DISCHARGE MODULE
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
3EGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =     4.45m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

      X         Y         Z         S         C         BV        BH
     .00       .00       .30      1.0   .256E+01       .01      9.90
** CMC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below CMC value of   .723E+00
   in the current prediction interval.
 This is the extent of the TOXIC DILUTION ZONE.
     .20       .00       .34      3.7   .687E+00       .09      9.67
     .40       .00       .38      4.9   .527E+00       .18      9.46
     .59       .00       .42      5.7   .447E+00       .27      9.26
     .79       .00       .45      6.5   .397E+00       .36      9.07
     .99       .00       .49      7.1   .361E+00       .44      8.89
    1.19       .00       .53      7.7   .333E+00       .53      8.72
    1.39       .00       .57      8.2   .312E+00       .62      8.57
    1.58       .00       .61      8.7   .294E+00       .71      8.41
    1.78       .00       .65      9.2   .279E+00       .80      8.27
    1.98       .00       .68      9.6   .266E+00       .89      8.14
    2.18       .00       .72     10.0   .255E+00       .98      8.01
    2.38       .00       .76     10.4   .245E+00      1.07      7.89
    2.57       .00       .80     10.8   .236E+00      1.16      7.77
    2.77       .00       .84     11.2   .229E+00      1.25      7.66
```

| | | | | | | |
|---|---|---|---|---|---|---|
| 2.97 | .00 | . | 11.6 | .221E+00 | 1.33 | 7.56 |
| 3.17 | .00 | .92 | 11.9 | .215E+00 | 1.42 | 7.46 |
| 3.37 | .00 | .95 | 12.2 | .209E+00 | 1.51 | 7.36 |
| 3.56 | .00 | .99 | 12.6 | .204E+00 | 1.60 | 7.27 |
| 3.76 | .00 | 1.03 | 12.9 | .199E+00 | 1.69 | 7.18 |
| 3.96 | .00 | 1.07 | 13.2 | .194E+00 | 1.78 | 7.10 |
| 4.16 | .00 | 1.11 | 13.5 | .190E+00 | 1.87 | 7.02 |
| 4.36 | .00 | 1.15 | 13.8 | .186E+00 | 1.96 | 6.94 |
| 4.55 | .00 | 1.19 | 14.1 | .182E+00 | 2.05 | 6.87 |
| 4.75 | .00 | 1.22 | 14.4 | .178E+00 | 2.14 | 6.80 |
| 4.95 | .00 | 1.26 | 14.6 | .175E+00 | 2.22 | 6.74 |
| 5.15 | .00 | 1.30 | 14.9 | .172E+00 | 2.31 | 6.67 |
| 5.35 | .00 | 1.34 | 15.2 | .169E+00 | 2.40 | 6.61 |
| 5.54 | .00 | 1.38 | 15.4 | .166E+00 | 2.49 | 6.56 |
| 5.74 | .00 | 1.42 | 15.7 | .163E+00 | 2.58 | 6.50 |
| 5.94 | .00 | 1.45 | 15.9 | .161E+00 | 2.67 | 6.45 |
| 6.14 | .00 | 1.49 | 16.2 | .158E+00 | 2.76 | 6.40 |

* WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard
or CCC value of .157E+00 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality
standard or CCC value.

| | | | | | | |
|---|---|---|---|---|---|---|
| → 6.34 | .00 | 1.53 | 16.4 | .156E+00 | 2.85 | 6.36 ← |
| 6.53 | .00 | 1.57 | 16.7 | .154E+00 | 2.94 | 6.32 |
| 6.73 | .00 | 1.61 | 16.9 | .151E+00 | 3.03 | 6.28 |
| 6.93 | .00 | 1.65 | 17.1 | .149E+00 | 3.11 | 6.25 |
| 7.13 | .00 | 1.69 | 17.4 | .147E+00 | 3.20 | 6.22 |
| 7.33 | .00 | 1.72 | 17.6 | .146E+00 | 3.29 | 6.19 |
| 7.52 | .00 | 1.76 | 17.8 | .144E+00 | 3.38 | 6.16 |
| 7.72 | .00 | 1.80 | 18.0 | .142E+00 | 3.47 | 6.14 |
| 7.92 | .00 | 1.84 | 18.2 | .140E+00 | 3.56 | 6.12 |
| 8.12 | .00 | 1.88 | 18.5 | .139E+00 | 3.65 | 6.10 |
| 8.32 | .00 | 1.92 | 18.7 | .137E+00 | 3.74 | 6.09 |
| 8.51 | .00 | 1.96 | 18.9 | .136E+00 | 3.83 | 6.07 |
| 8.71 | .00 | 1.99 | 19.1 | .134E+00 | 3.92 | 6.06 |
| 8.91 | .00 | 2.03 | 19.3 | .133E+00 | 4.00 | 6.05 |
| 9.11 | .00 | 2.07 | 19.5 | .131E+00 | 4.09 | 6.05 |
| 9.31 | .00 | 2.11 | 19.7 | .130E+00 | 4.18 | 6.04 |
| 9.50 | .00 | 2.15 | 19.9 | .129E+00 | 4.27 | 6.03 |
| 9.70 | .00 | 2.19 | 20.1 | .127E+00 | 4.36 | 6.03 |
| 9.90 | .00 | 2.22 | 20.3 | .126E+00 | 4.45 | 6.03 |

Cumulative travel time = 72. sec

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

---

---

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

---

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

Profile definitions:
- BV = top-hat thickness, measured vertically
- BH = Gaussian 1/e (37%) half-width in horizontal plane normal to trajectory
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic centerline dilution
- C = centerline concentration (includes reaction effects, if any)

| X | Y | Z | S | C | BV | BH |
|---|---|---|---|---|---|---|
| 9.90 | .00 | 4.45 | 20.3 | .126E+00 | 4.45 | 6.80 |
| 20.51 | .00 | 4.45 | 21.6 | .118E+00 | 2.47 | 13.70 |
| 31.12 | .00 | 4.45 | 22.8 | .112E+00 | 2.03 | 18.37 |
| 41.73 | .00 | 4.45 | 24.0 | .106E+00 | 1.80 | 22.62 |
| 52.34 | .00 | 4.45 | 25.1 | .101E+00 | 1.66 | 26.66 |
| 62.95 | .00 | 4.45 | 26.2 | .964E-01 | 1.55 | 30.59 |
| 73.56 | .00 | 4.45 | 27.2 | .924E-01 | 1.47 | 34.45 |
| 84.17 | .00 | 4.45 | 28.2 | .889E-01 | 1.41 | 38.26 |
| 94.78 | .00 | 4.45 | 29.2 | .857E-01 | 1.36 | 42.04 |
| 105.39 | .00 | 4.45 | 30.1 | .827E-01 | 1.32 | 45.80 |
| 116.00 | .00 | 4.45 | 31.0 | .801E-01 | 1.28 | 49.55 |
| 126.61 | .00 | 4.45 | 31.9 | .776E-01 | 1.25 | 53.28 |
| 137.22 | .00 | 4.45 | 32.7 | .753E-01 | 1.22 | 57.01 |
| 147.83 | .00 | 4.45 | 33.5 | .731E-01 | 1.19 | 60.74 |
| 158.44 | .00 | 4.45 | 34.4 | .711E-01 | 1.17 | 64.47 |
| 169.05 | .00 | 4.45 | 35.1 | .692E-01 | 1.15 | 68.20 |
| 179.66 | .00 | 4.45 | 35.9 | .674E-01 | 1.13 | 71.93 |
| 190.27 | .00 | 4.45 | 36.7 | .658E-01 | 1.11 | 75.66 |
| 200.88 | .00 | 4.45 | 37.4 | .642E-01 | 1.10 | 79.40 |
| 211.49 | .00 | 4.45 | 38.1 | .627E-01 | 1.08 | 83.15 |
| 222.10 | .00 | 4.45 | 38.9 | .612E-01 | 1.07 | 86.89 |
| 232.71 | .00 | 4.45 | 39.6 | .599E-01 | 1.05 | 90.65 |
| 243.32 | .00 | 4.45 | 40.2 | .586E-01 | 1.04 | 94.41 |
| 253.93 | .00 | 4.45 | 40.9 | .573E-01 | 1.03 | 98.18 |
| 264.54 | .00 | 4.45 | 41.6 | .561E-01 | 1.02 | 101.95 |
| 275.15 | .00 | 4.45 | 42.2 | .550E-01 | 1.01 | 105.73 |
| 285.76 | .00 | 4.45 | 42.9 | .539E-01 | 1.00 | 109.52 |
| 296.37 | .00 | 4.45 | 43.5 | .528E-01 | .99 | 113.32 |
| 306.98 | .00 | 4.45 | 44.2 | .518E-01 | .98 | 117.12 |
| 317.59 | .00 | 4.45 | 44.8 | .508E-01 | .97 | 120.93 |
| 328.20 | .00 | 4.45 | 45.4 | .499E-01 | .96 | 124.74 |
| 338.81 | .00 | 4.45 | 46.0 | .490E-01 | .95 | 128.57 |
| 349.42 | .00 | 4.45 | 46.6 | .481E-01 | .94 | 132.40 |
| 360.03 | .00 | 4.45 | 47.2 | .472E-01 | .93 | 136.24 |
| 370.64 | .00 | 4.45 | 47.7 | .464E-01 | .93 | 140.08 |
| 381.25 | .00 | 4.45 | 48.3 | .456E-01 | .92 | 143.93 |
| 391.86 | .00 | 4.45 | 48.9 | .448E-01 | .91 | 147.79 |
| 402.47 | .00 | 4.45 | 49.4 | .440E-01 | .91 | 151.66 |
| 413.08 | .00 | 4.45 | 50.0 | .433E-01 | .90 | 155.53 |
| 423.69 | .00 | 4.45 | 50.5 | .425E-01 | .89 | 159.41 |
| 434.30 | .00 | 4.45 | 51.1 | .418E-01 | .89 | 163.30 |
| 444.91 | .00 | 4.45 | 51.6 | .412E-01 | .88 | 167.19 |
| 455.52 | .00 | 4.45 | 52.1 | .405E-01 | .87 | 171.09 |
| 466.13 | .00 | 4.45 | 52.7 | .398E-01 | .87 | 175.00 |
| 476.74 | .00 | 4.45 | 53.2 | .392E-01 | .86 | 178.91 |
| 487.35 | .00 | 4.45 | 53.7 | .386E-01 | .86 | 182.83 |
| 497.96 | .00 | 4.45 | 54.2 | .380E-01 | .85 | 186.76 |
| 508.57 | .00 | 4.45 | 54.7 | .374E-01 | .85 | 190.69 |
| 519.18 | .00 | 4.45 | 55.2 | .368E-01 | .84 | 194.63 |
| 529.79 | .00 | 4.45 | 55.7 | .362E-01 | .84 | 198.58 |
| 540.40 | .00 | 4.45 | 56.2 | .357E-01 | .83 | 202.53 |

Cumulative travel time = 40749. sec

ND OF MOD251: DIFFUSER PLUME IN CO-FLOW

---

* End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be

```
 CORRECTED by a factor     .1 to conserve the mass f   . in the far-field!

 The LIMITING DILUTION (given by ambient flow/discharge ratio) is:     36.6
   This value is below the computed dilution of     56.2 at the end
   of the NFR.
   Mixing for this discharge configuration is constrained by the ambient flow.

 The previous module predictions are unreliable since the limiting dilution
   cannot be exceeded for this unstable shallow discharge configuration.

 A subsequent module (MOD281) will predict the properties of the
   cross-sectionally fully mixed plume with limiting dilution and will
   compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
 Bottom coordinate for FAR-FIELD is determined by average depth, ZFB =    .03m
-------------------------------------------------------------------------------
BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =      36.6

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =       .80

 No upstream wedge intrusion takes place since FCHAN exceeds the critical
   value of 0.7.
      X         Y         Z         S         C         BV        BH       ZU       ZL
    540.40    -33.10     4.45      36.6   .548E-01     4.45     98.67     4.45      .03
 Cumulative travel time =        40749. sec

 VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION
-------------------------------------------------------------------------------
 ** REGULATORY MIXING ZONE BOUNDARY is within the Near-Field Region (NFR) **
-------------------------------------------------------------------------------
CORMIX2: Submerged Multiport Diffuser Discharges        End of Prediction File
?222222222222222222222222222222222222222222222222222222222222222222222222
```

CORMIX2 PREDICTION FILE:
222222222222222222222222222222222222222222222222222222222222222222222222
CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX2: Subsystem version:
Submerged Multiport Diffuser Discharges CORMIX_v.3.20 September_1996
---
---

CASE DESCRIPTION
Site name/label: GP003_Diffuser
Design case: use^antideg^baseline^for^ammonia^CCC
FILE NAME: cormix\sim\gpdiff3 .cx2
Time of Fortran run: 07/22/98--13:21:33

1910

ENVIRONMENT PARAMETERS (metric units)
Bounded section
BS = 98.67 AS = 436.12 QA = 10.68 ICHREG= 1
HA = 4.42 HD = 4.45
UA = .024 F = .043 USTAR = .1797E-02
UW = 2.000 UWSTAR= .2198E-02
Uniform density environment
STRCND= U RHOAM = 996.4861

DIFFUSER DISCHARGE PARAMETERS (metric units)
Diffuser type: DITYPE= unidirectional_perpendicular
BANK = RIGHT DISTB = 33.10 YB1 = 23.20 YB2 = 43.00
LD = 19.80 NOPEN = 15 SPAC = 1.41
D0 = .152 A0 = .018 H0 = .30
Nozzle/port arrangement: unidirectional_without_fanning
GAMMA = 90.00 THETA = 30.00 SIGMA = .00 BETA = 90.00
U0 = 2.192 Q0 = .364 = .3640E+00
RHO0 = 995.3405 DRHO0 = .1146E+01 GP0 = .1127E-01
C0 = .4200E+01 CUNITS= degC
IPOLL = 3 KS = .2000E-05 KD = .0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
q0 = .1838E-01 m0 = .4030E-01 j0 = .2073E-03 SIGNJ0= 1.0
Associated 2-d length scales (meters)
lQ=B = .008 lM = 11.48 lm = 67.14
lmp = 99999.00 lbp = 99999.00 la = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
Q0 = .3640E+00 M0 = .7980E+00 J0 = .4104E-02
Associated 3-d length scales (meters)
LQ = .41 LM = 13.18 Lm = 36.46 Lb = 279.05
Lmp = 99999.00 Lbp = 99999.00

NON-DIMENSIONAL PARAMETERS
FR0 = 225.46 FRD0 = 52.95 R = 89.48
(slot) (port/nozzle)

FLOW CLASSIFICATION
22222222222222222222222222222222222222
2 Flow class (CORMIX2) = MU2 2
2 Applicable layer depth HS = 4.45 2
22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
C0 = .4200E+01 CUNITS= ~~degC~~ mg/l
NTOX = 1 CMC = .7246E+00 CCC = CSTD
NSTD = 1 CSTD = .1156E+00

Ammonia Antidegradation Baselines

```
 REGMZ =  1
 REGSPC=  1          XREG  =    793.35  WREG  =       .00  AREG  =       .00
 XINT  =   4735.00   XMAX  =   4735.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
        33.10 m  from the RIGHT bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 20 display intervals per module

NOTE on dilution/concentration values for this HEATED DISCHARGE (IPOLL=3):
   S  = hydrodynamic dilutions, include buoyancy (heat) loss effects, but
        provided plume has surface contact
   C  = corresponding temperature values (always in "degC"!),
        include heat loss, if any
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

      X        Y        Z        S        C        BV       BH
     .00      .00      .30      1.0   .420E+01     .01     9.90

END OF MOD201: DIFFUSER DISCHARGE MODULE
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    4.45m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

      X        Y        Z        S        C        BV       BH
     .00      .00      .30      1.0   .420E+01     .01     9.90
     .49      .00      .40      5.1   .817E+00     .22     9.33
** CMC HAS BEEN FOUND **
The pollutant concentration in the plume falls below CMC value of   .725E+00
  in the current prediction interval.
This is the extent of the TOXIC DILUTION ZONE.
     .99      .00      .49      6.9   .613E+00     .44     8.85 <-
    1.48      .00      .59      8.2   .514E+00     .67     8.42
    1.98      .00      .69      9.3   .452E+00     .89     8.06
    2.47      .00      .78     10.3   .409E+00    1.11     7.73
    2.97      .00      .88     11.1   .377E+00    1.33     7.45
    3.46      .00      .97     12.0   .351E+00    1.56     7.20
    3.96      .00     1.07     12.7   .330E+00    1.78     6.97
```

| | | | | | | |
|---|---|---|---|---|---|---|
| 4.45 | .00 | 1. | 13.4 | .313E+00 | 2.00 | 6.77 |
| 4.95 | .00 | 1.26 | 14.1 | .298E+00 | 2.22 | 6.59 |
| 5.44 | .00 | 1.36 | 14.7 | .285E+00 | 2.45 | 6.43 |
| 5.94 | .00 | 1.45 | 15.3 | .274E+00 | 2.67 | 6.29 |
| 6.43 | .00 | 1.55 | 15.9 | .264E+00 | 2.89 | 6.17 |
| 6.93 | .00 | 1.65 | 16.5 | .255E+00 | 3.11 | 6.08 |
| 7.42 | .00 | 1.74 | 17.0 | .246E+00 | 3.34 | 6.00 |
| 7.92 | .00 | 1.84 | 17.6 | .239E+00 | 3.56 | 5.94 |
| 8.41 | .00 | 1.94 | 18.1 | .232E+00 | 3.78 | 5.90 |
| 8.91 | .00 | 2.03 | 18.6 | .226E+00 | 4.00 | 5.87 |
| 9.40 | .00 | 2.13 | 19.1 | .220E+00 | 4.23 | 5.86 |
| 9.90 | .00 | 2.22 | 19.5 | .215E+00 | 4.45 | 5.85 |

Cumulative travel time = 72. sec

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

---

---

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

---

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

Profile definitions:
- BV = top-hat thickness, measured vertically
- BH = Gaussian 1/e (37%) half-width in horizontal plane normal to trajectory
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic centerline dilution
- C = centerline concentration (includes reaction effects, if any)

| X | Y | Z | S | C | BV | BH |
|---|---|---|---|---|---|---|
| 9.90 | .00 | 4.45 | 19.5 | .215E+00 | 4.45 | 6.60 |
| 51.03 | .00 | 4.45 | 24.4 | .172E+00 | 1.70 | 25.70 |
| 92.17 | .00 | 4.45 | 28.4 | .148E+00 | 1.41 | 40.66 |
| 133.30 | .00 | 4.45 | 31.9 | .132E+00 | 1.28 | 55.25 |
| 174.43 5721 | .00 | 4.45 | 35.1 | .120E+00 | 1.19 | 69.82 |

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of .116E+00 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

| | | | | | | |
|---|---|---|---|---|---|---|
| 215.56 | .00 | 4.45 | 38.0 | .110E+00 | 1.13 | 84.46 |
| 256.70 | .00 | 4.45 | 40.7 | .103E+00 | 1.08 | 99.19 |
| 297.83 | .00 | 4.45 | 43.3 | .971E-01 | 1.04 | 114.04 |
| 338.96 | .00 | 4.45 | 45.7 | .920E-01 | 1.00 | 128.99 |
| 380.09 | .00 | 4.45 | 47.9 | .876E-01 | .97 | 144.07 |
| 421.23 | .00 | 4.45 | 50.1 | .838E-01 | .95 | 159.25 |
| 462.36 | .00 | 4.45 | 52.2 | .805E-01 | .92 | 174.54 |
| 503.49 | .00 | 4.45 | 54.2 | .775E-01 | .90 | 189.94 |
| 544.62 | .00 | 4.45 | 56.1 | .748E-01 | .88 | 205.43 |
| 585.76 | .00 | 4.45 | 58.0 | .724E-01 | .87 | 221.03 |
| 626.89 | .00 | 4.45 | 59.8 | .702E-01 | .85 | 236.71 |
| 668.02 | .00 | 4.45 | 61.6 | .682E-01 | .83 | 252.49 |
| 709.15 | .00 | 4.45 | 63.3 | .664E-01 | .82 | 268.35 |
| 750.29 | .00 | 4.45 | 64.9 | .647E-01 | .81 | 284.30 |
| 791.42 | .00 | 4.45 | 66.5 | .631E-01 | .79 | 300.33 |
| 832.55 | .00 | 4.45 | 68.1 | .617E-01 | .78 | 316.43 |

Cumulative travel time = 74317. sec

END OF MOD251: DIFFUSER PLUME IN CO-FLOW

---

** End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be CORRECTED by a factor 1.41 to conserve the mass flux in the far-field!

The LIMITING DILUTION (given by ambient flow/discharge ratio) is: 30.4
This value is below the computed dilution of 68.1 at the end of the NFR.
Mixing for this discharge configuration is constrained by the ambient flow.

The previous module predictions are unreliable since the limiting dilution cannot be exceeded for this unstable shallow discharge configuration.

A subsequent module (MOD281) will predict the properties of the cross-sectionally fully mixed plume with limiting dilution and will compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
Bottom coordinate for FAR-FIELD is determined by average depth, ZFB = .03m

---

BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

The DOWNSTREAM flow field for this unstable shallow water discharge is VERTICALLY FULLY MIXED.
The mixing is controlled by the limiting dilution = 30.4

Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow = .60

An UPSTREAM INTRUDING WEDGE is formed along the surface/pycnocline.

UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):

| | | |
|---|---|---|
| Wedge length | = | 26.17 m |
| X-Position of wedge tip | = | 806.38 m |
| Thickness at discharge (end of NFR) | = | 1.28 m |

(Wedge thickness gradually decreases to zero at wedge tip.)

| X | Y | Z | S | C | BV | BH | ZU | ZL |
|---|---|---|---|---|---|---|---|---|
| 832.55 | -33.10 | 4.45 | 30.4 | .138E+00 | 4.45 | 98.67 | 4.45 | .03 |

Cumulative travel time = 74317. sec 20.64 hr

VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

---

** REGULATORY MIXING ZONE BOUNDARY is within the Near-Field Region (NFR) **

---

CORMIX2: Submerged Multiport Diffuser Discharges End of Prediction File

?22222222222222222222222222222222222222222222222222222222222222222222222

France,Becky
**From:** France,Becky
**Sent:** Tuesday, September 16, 2008 9:39 AM
**To:** Brockenbrough,Allan
**Subject:** RE: GA Pacific Chemical Mixing Zone Study Plan

**Attachments:** Fact Sheet GP 2005 Final Version Revised.doc; Fact Sheet Flow MEMORANDUM GP 2005.doc

Thank you for taking the time to thoroughly evaluate this study report. The 7Q10 and 1Q10 values that I have for the 2005 reissuance permit correlate with the study numbers. The Fact Sheet went through several revisions, and my copy must be different from yours. The final revision date was 6/14/05. I am sorry that the most recent copy did not get sent to your office. I have attached a copy of the main part of the 2005 Fact Sheet.

Fact Sheet GP 2005 Final Versi...

Fact Sheet Flow EMORANDUM GP

Again, thank you for your help analyzing the study information.

---

**From:** Brockenbrough,Allan
**Sent:** Tuesday, September 16, 2008 9:10 AM
**To:** France,Becky
**Subject:** RE: GA Pacific Chemical Mixing Zone Study Plan

Becky-

I have reviewed the GP Big Island Chemical Mixing Zone Study Report dated October 2007 and prepared by Olver, Inc. and have the following comments:

- Because of the differences in the effluent flow, river flow, number of discharge ports, etc. between the CORMIX runs and the instream study, there is really no way to precisely confirm the previous CORMIX results without running CORMIX under the conditions measured during the instream study. I do not have a current CORMIX license to be able to run that analysis but ideally it would have been provided by the consultant.
- There are numerous discrepancies between referenced 7Q10 flows that I haven't been able to sort out. The study report references a 7Q10 of 339 MGD for outfall 003 from the VPDES Fact Sheet. However, the Fact Sheet on file includes a 7Q10 of 559 MGD (p. 2) or 562 MGD (Attachment A) for outfall 003. The original CORMIX runs included a 7Q10 flow of only 295 MGD. Actual flows during the study were approximately 640 MGD.
- The depth of the instream maximum conductivity readings indicate that the effluent plume may not be as buoyant as was assumed in the CORMIX modeling, thus reducing mixing. This reduction in mixing may be partially counteracted by the increase in 7Q10 flow (from 295 MGD to approximately 560 MGD).

Despite the discrepancies between the CORMIX model runs and the stream survey, I believe that both indicate that all water quality criteria are met within a very short distance from the outfall and that we can continue to use the 11:1 (acute) and 21:1 (chronic) mixing ratios previously adopted. According to the study report, the only toxic parameter measured in the effluent at levels exceeding the WQC is Ammonia-N. The acute Ammonia-N criterion would require a dilution ratio of 1.37:1 to avoid an effluent limit. This amount of mixing is certainly provided within 1 meter of the diffuser. The report indicates that the chronic Ammonia-N criterion would require a dilution ratio of 10.9:1 to avoid an effluent limit. However, this is assuming a maximum effluent Ammonia-N concentration of 7.2 mg/l. Using the 97$^{th}$% of 30-day averages of approximately 3.7 mg/l reduces the required mixing dilution ratio to 5.7:1. This dilution factor is certainly provided within the regulatory mixing zone of approximately 10 meters established by DEQ. Please note that dilution ratios of 11:1 (acute) and 21:1 (chronic) were apparently approved based on the original CORMIX runs. When using Mstranti.xls, these ratios should be entered as receiving stream flows of 10 (1Q10) and 20 (7Q10) rather than 11 and 21.

Feel free to give me a call with any questions or if you would like this put into a memo.

Allan

-----Original Message-----
**From:** France,Becky
**Sent:** Monday, September 15, 2008 9:34 AM
**To:** Brockenbrough,Allan
**Subject:** GA Pacific Chemical Mixing Zone Study Plan

I just wanted to follow up on the GP Big Island Chemical Mixing Zone Study Plan and see if you have any comments from running the CORMIX model. Do the model results correlate with the study results?

# TABLE OF CONTENTS



## List of Figures



OLVER INCORPORATED

# 1.0 INTRODUCTION

## 1.1 Background

The Georgia Pacific Corporation pulp and paper facility in Big Island, Virginia produces corrugated medium and liner board. Treated manufacturing wastewater is discharged into the James River via Outfall 003 in accordance with the provisions of VPDES Permit No. VA0003026. The permit issued to Georgia Pacific in 1994 included an impending ammonia limit based on the potential for this effluent to exceed the acute water quality standard in effect at that time.

To eliminate the need for the impending ammonia limit as well as to reduce the potential for future limits for other constituents, Georgia Pacific elected to replace the side-stream discharge structure with a submerged multi-port effluent diffuser. To determine optimal diffuser configuration, Olver Laboratories conducted an effluent mixing zone study that included effluent modeling to support the elimination of the ammonia limit. As part of this study, river velocity and river depth across the river in the vicinity of Outfall 003 were measured in October 1996 during typical seasonal low river flow conditions. The field and corresponding gauged river flow data were also used to calculate average river velocity values. This data was used with effluent flow and other site-specific information as input parameters for use with the Cornell Mixing Zone Expert System (CORMIX) model to determine optimal diffuser configuration (number of ports, discharge angle, discharge velocity, etc.).

The results of the mixing zone modeling were summarized in the November 14, 1997 report prepared by Olver Laboratories and submitted to the

Virginia Department of Environmental Quality (DEQ). In short, the modeling indicated that during 1Q10 conditions, the effluent comprised only 1 part in 19.5 parts of the mixed river water after 1.2 minutes at a distance of 9.9 meters from the diffuser. The model output indicated that the mixing results were unreliable for time intervals greater than 1.2 minutes. Under 7Q10 conditions, the model indicated that complete effluent mixing occurred at a distance of approximately 539 meters after 11.3 hours. This data was used to support the design and installation of the effluent diffuser that was installed in 1998 and currently in place at Outfall 003. The VPDES permit was modified to reflect the installation of the diffuser and the elimination of the impending ammonia limit.

The VPDES permit reissued in June 2000 included a requirement for the performance of a Chemical Mixing Zone Study to confirm the projections provided by the CORMIX modeling. Specifically, Part I.D.18 of the permit states:

> A mixing zone study shall be performed on effluent from outfall 003. The study must identify the spatial area of the James River that exceeds the numeric Water Quality Standards and shall be conducted when the river is less than twice the 7Q10 flow.

This plan was prepared to provide a summary of the methods, reporting, and schedule proposed to fulfill the permit requirement and is submitted to the Virginia DEQ for review and comment prior to the initiation of the program.

### 1.2 Objectives

The primary objectives of this study include:

1. The determination of Outfall 003 effluent mixing upon discharge to the James River during low flow conditions;

2. The determination of Outfall 003 effluent pollutants with the potential to exceed water quality standards using historical monitoring results; and,

3. The identification of the spatial area of the James River that exceeds the numeric water quality standards during periods of low river flow.

## 2.0 STUDY METHODS

### 2.1 Project Approach

The project will consist of three main components:

1. The determination of river and effluent mixing characteristics during river flows less than twice the established 7Q10 value.

2. The determination of those effluent parameters with the potential to exceed numeric water quality standards using recent historical effluent monitoring data.

3. The determination of the spatial area of the James River that exceeds the numeric acute and chronic water quality standards.

### 2.2 Study Site

The Georgia Pacific Big Island Mill is located in northeastern Bedford County near the Amherst County line. A map of this area is depicted in Figure 1. The James River at this point is a broad relatively deep river, designated as the Upper James River Basin, Section 11, Class II. A small dam and impoundment that serves as a source of water for hydroelectric power generation and cooling water for the mill bound the facility upstream. Approximately four miles downstream of the mill dam is the Coleman Falls Dam. Both dams are run-of-the-river facilities; as such, river flow is not regulated by either of the dams.

The mixing zone study site is the area adjacent to, and downstream of, Outfall 003. Outfall 003 is located approximately 1.25 miles downstream of the

mill dam and approximately 2.9 miles upstream of the Coleman Falls Dam at a point immediately prior to the confluence of Long Branch with the James River. At this point, the river is approximately 98 meters (325 feet) in width, with and average depth of approximately 4.4 meters (14.6 feet).

## 2.3 Effluent Mixing Determination

### 2.3.1 River Flow Conditions

The effluent mixing determination will be performed when river flows are less than twice the 7Q10 established for this discharge. The 7Q10 for Outfall 003 as established in the VPDES permit Program Fact Sheet for the June 2000 permit is 283.9 MGD or 439.3 CFS. As such, the field component of this study will be performed when river flows are less than twice the 7Q10, or less than 878.6 CFS. River flows will be monitored using the United States Geologic Survey (USGS) Holcomb Rock Gage Station (02025500) which will be accessed using the Internet.

### 2.3.2 Effluent Mixing Determination

The effluent discharged at Outfall 003 is characterized by elevated specific conductance, typically in the vicinity of 1,500 *u*mhos/cm. Background river levels are expected to be approximately 200 *u*mhos/cm. As such, effluent mixing will be determined by measuring conductivity in the river at selected points upstream and downstream of the Outfall 003 diffuser. The conductivity and temperature of the effluent will be measured prior to the initiation of the river monitoring and at several times throughout the performance of the field work. These are not expected to change substantially over the course of the monitoring period since

the wastewater discharged from 003 is contained in a very large (approximately 20 acre) sedimentation basin/stabilization pond. Background river conductivity and temperature will be measured at several locations along a transect located approximately 25 meters upstream of the diffuser and the beyond the influence of the Outfall 003 wastewater.

The effluent mixing patterns in the river will be determined by measuring conductivity in areas downstream of the diffuser. Transects will be located at distances of approximately 10 meters, 50 meters, 100 meters, 250 meters, and 500 meters. The 10-meter distance represents the distance for substantial mixing during 1Q10 conditions based on the earlier CORMIX modeling, while the 500 meters represents the projected area for complete mix during 7Q10 conditions. It is anticipated that there will not be a potential for an exceedence of water quality standards beyond this point. The remaining distances were selected to better define the spatial areas of any water quality standards exceedence.

Conductivity measurements will be made at 5-meter intervals along each transect starting from the right (discharge side) bank. These will continue toward the far (left) bank until the conductivity readings approach or reach the previously established background levels. Measurements will be made at the surface (6 inches) and at depth intervals of 3-5 feet. The transect distances, width intervals, and depth intervals may be adjusted to better define the effluent mixing based on the conditions encountered in the field.

All conductivity measurements will be made using a YSI Model 30 SCT meter with a 25 foot cable and probe. This meter will be calibrated prior to use in accordance with method requirements. Distances from the diffuser and bank will be measured using a Bushnell Yardage Pro 500 distance meter.

2.3.3 Effluent Mixing Data Analysis

The river conductivity data for the downstream transects will be used to determine the ratio of effluent and river water at each of the sampling locations. This calculation will be performed using the effluent conductivity data and the upstream background data. The corresponding dilution factor for each sampling location will be used in conjunction with the effluent water quality standards data to determine the spatial area of any instream water quality standards exceedence.

## 2.4 Water Quality Standards Evaluation

### 2.4.1 Effluent Characteristics

The chemical characteristics of Outfall 003 were determined previously in conjunction with recent water quality standards monitoring required by the VPDES permit as well as for VPDES permit reissuance applications. The data developed for Outfall 003 will be used to identify those pollutants with the potential to exceed instream water quality standards. The data for those pollutants measured at concentrations above their respective detection/quantification limits will be compared to the acute and chronic waste load allocation values for this discharge. Those parameters that exceed 40 percent of their respective acute waste load allocations or 60 percent of their

respective chronic waste load allocations will be examined further to determine the spatial area for an exceedence, if any, of instream water quality standards.

2.4.2 Determination of Spatial Areas

The spatial area of acute and chronic water quality standards exceedence will be determined for those parameters identified in Section 2.4.1. The highest measured concentration for each target parameter will be used in conjunction with the dilution factors established for each monitoring location to calculate a projected instream concentration. The projected concentration values will be compared to the respective acute and chronic water quality standards to identify any areas of exceedence. The spatial area(s) will then be calculated for each parameter.

## 3.0 REPORTING

Within approximately 120 days of completion of the field activities, a final narrative report that presents the results of the study will be submitted to the Virginia Department of Environmental Quality. The final report will present the following:

1. A summary of the methodology used, including any deviations from the approved study plan.
2. The effluent and river mixing data for locations upstream and downstream of the effluent diffuser.
3. A summary of the water quality standards evaluations for those parameters with the potential to exceed the numeric acute and chronic water quality standards.
4. The spatial area of the James River that exceeds the numeric acute and chronic water quality standards.

## 4.0 SCHEDULE

In accordance with permit requirements, the field component of this study will be performed during river flows that are less than two times the 7Q10 established for this site. It is anticipated that this will be performed in the October-November 2002 time frame, provided that river flows remain at or near the current levels. Upon completion of the field component of the study, the evaluation of water quality standards will be examined and the spatial area of the James River that exceeds the numeric water quality standards will be determined. The final report will be prepared and submitted to the Virginia DEQ upon completion of the spatial determinations. It is anticipated that the report will be submitted to DEQ within 120 days of completing the field studies.

File

# COMMONWEALTH of VIRGINIA

*DEPARTMENT OF ENVIRONMENTAL QUALITY*

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

West Central Regional Office
3019 Peters Creek Road, Roanoke, Virginia 24019
Telephone (540) 562-6700, Fax (540) 562-6725
www.deq.state.va.us

Robert G. Burnley
Director

Steven A. Dietrich
Regional Director

November 5, 2002

Mr. J. Patrick Moore
Georgia-Pacific Corporation
PO Box 40
Big Island, VA 24526

RE: VPDES Permit No. VA0003026
Permit Part I.D.18; Received October 21, 2002; Conditional Acceptance of Chemical Mixing Zone Study Plan; Georgia-Pacific Corporation

Dear Mr. Moore:

This office has received and reviewed the above referenced Chemical Mixing Zone Study Plan. The Plan describes procedures to evaluate the effluent mixing zone for outfall 003 and define the spatial area of the James River that exceeds the acute and chronic water quality criteria. The study is to be conducted when the River is less than twice the 7Q10 flow. This plan proposes to use conductivity taken at five transects to determine dilution factors which can be used to calculate any areas of water quality exceedances. A few modifications to the sampling protocol are discussed below.

The diffuser will discharge 15 separate plumes. At the 10-meter transect, one sample every 5 meters will not ensure that the concentration measured is in one of the plumes. Conductivity should be monitored continuously as the river is crossed with the high and low readings recorded as each plume is crossed. Continuous conductivity measurements should also be taken at a 25 meter transect which is approximately the length of the current mixing zone.

At each sampling location, at least two vertical profiles should be performed and a transect completed at the depth with the highest conductivity.

The plan does not indicate how the boat will be propelled. The river appears to be deep and slow moving in this section. Steps need to be taken to eliminate any disturbance of the water column near the conductivity meter, especially anywhere the plume approaches the surface.

Conductivity in the Georgia Pacific effluent (about 1500 umhos/cm) is reportedly about 7.5 times that in the river (about 200 umhos/cm). This relatively small gradient may disappear within a very short distance of the outfall. If the conductivity measurements do not provide useful results, the study needs to be repeated using dye.

The mixing zone study data will be used to confirm the results predicted by the CORMIX mixing zone model. The mixing zone data will be used by DEQ in future permitting decisions regarding water quality criteria evaluations. Should you have any questions, please contact Becky L. France at (540) 562-6793 or blfrance@deq.state.va.us.

Sincerely,

Steven A. Dietrich

Steven A. Dietrich, P.E.
Regional Director

cc: R. Lawrence Hoffman, Olver Incorporated

# COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

L. Preston Bryant, Jr.
Secretary of Natural Resources

3019 Peters Creek Road, Roanoke, Virginia 24019
(540) 562-6700 Fax (540) 562-6725
www.deq.virginia.gov

David K. Paylor
Director

Steven A. Dietrich
Regional Director

October 2, 2008

Mr. Tim Pierce
GP Big Island LLC
PO Box 40
Big Island, VA 24526

RE: VPDES Permit No. VA0003026; GP Big Island LLC; Required by Part I.D.13; Received October 15, 2007; Acceptance of Chemical Mixing Zone Report

Dear Mr. Pierce:

The above referenced Chemical Mixing Zone Report was received in this office on October 15, 2007. This report has been reviewed by regional permitting staff and Central office staff. The submittals appear to satisfy Section I.D.13 of VPDES Permit VA0003026. Acceptance of the above reports does not relieve the permittee (owner) of the responsibility of maintaining and operating the facility in a manner that is consistent with sound operational and maintenance principles and practices.

In accordance with the permit, the study was conducted in August of 2006 during a period when the receiving stream averaged less than twice the 7Q10. The river flows during the field study were greater than those used in the CORMIX modeling. Conductivity and temperature were measured along transacts from 10 to 500 meters below the outfall. Rapid mixing occurred within the first 10 meters. The report concluded that for ammonia the calculated dilution factors showed that the acute and chronic water quality criteria were attained along the 10 meter transect downstream of the diffuser. Refer to the enclosed memorandums for staff review comments. Should you have any questions, please contact Becky L. France at (540) 562-6793.

Sincerely,

Robert J. Weld
Deputy Regional Director

Enclosures: Chemical Mixing Zone Study Report review memorandums

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
*West Central Regional Office*

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: GP Big Island LLC (VA00030206) Chemical Mixing Zone Study Report

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BLF

DATE: November 1, 2007

I have enclosed a copy of the Chemical Mixing Zone Study Report for GP Big Island. This report was required by a special condition in their VPDES permit. This condition requires that a mixing zone study be performed on outfall 003 to identify the spatial area of the James River that exceeds the numeric Water Quality Standards. This study is to be conducted when the receiving stream is less than twice the 7Q10 flow. The purpose of the study is to determine whether the size of the mixing zone predictions given in CORMIX model are conservative enough be protective of Water Quality Standard Regulations.

The process effluent for the facility is discharged into the James River via a submerged 17 port diffuser. The study was conducted in August 2006 during a period of time when the receiving stream averaged 640 MGD which was less than twice the 7Q10 flow. The effluent flow during the study averaged 6.85 MGD which was less than the 7.14 MGD flow used in a CORMIX model. Conductivity and temperature were measured along transacts located at 10, 25, 50, 100, and 500 meters below the outfall. These measurements were used to define the mixing zone.

Tables 3 (page 22) in the report describes field and CORMIX model conditions and Table 4 (page.23) compares the dilution factors calculated in the field with the CORMIX model dilution factor calculations. The dilution factor calculations were based upon an average stream flow of 640 MGD. As we discussed, please provide your insights as to whether the CORMIX model predictions would be consistent with the study results when the stream flow was 640 MGD and effluent flow was 6.85 MGD.

# Attachment J

## Wasteload and Limit Calculations

- Storm Water Criteria Spreadsheet

<u>Outfall 002</u>

- Antidegradation Wasteload Allocation Spreadsheet

<u>Outfall 003</u>

- Antidegradation Wasteload Allocation Spreadsheet
- STATS Program Output (ammonia)
- Federal Effluent Guidelines Excerpt (40 CFR Part 430 – Subparts F & J)

# FRESHWATER
# WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (stormwater oufalls acute WLAs only) Permit No.: VA0003026

Receiving Stream: James River

Version: OWP Guidance Memo 00-2011 (8/24/00)

**Stream Information**

| | |
|---|---|
| Mean Hardness (as CaCO3) = | 101 mg/L |
| 90% Temperature (Annual) = | 17.7 deg C |
| 90% Temperature (Wet season) = | 26.5 deg C |
| 90% Maximum pH = | 8.1 SU |
| 10% Maximum pH = | 7.4 SU |
| Tier Designation (1 or 2) = | 2 |
| Public Water Supply (PWS) Y/N? = | n |
| Trout Present Y/N? = | n |
| Early Life Stages Present Y/N? = | y |

**Stream Flows**

| | |
|---|---|
| 1Q10 (Annual) = | 1 MGD |
| 7Q10 (Annual) = | 1 MGD |
| 30Q10 (Annual) = | 1 MGD |
| 1Q10 (Wet season) = | 1 MGD |
| 30Q10 (Wet season) | 1 MGD |
| 30Q5 = | 1 MGD |
| Harmonic Mean = | 1 MGD |

**Mixing Information**

| | |
|---|---|
| Annual - 1Q10 Mix = | 100 % |
| - 7Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |
| Wet Season - 1Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |

**Effluent Information**

| | |
|---|---|
| Mean Hardness (as CaCO3) = | 101 mg/L |
| 90% Temp (Annual) = | 17.7 deg C |
| 90% Temp (Wet season) = | 26.5 deg C |
| 90% Maximum pH = | 8.1 SU |
| 10% Maximum pH = | 7.4 SU |
| Discharge Flow = | 1 MGD |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Acenapthene | 0 | -- | -- | na | 9.9E+02 | -- | -- | na | 2.0E+03 | -- | -- | na | 9.9E+01 | -- | -- | na | 2.0E+02 | -- | -- | na | **2.0E+02** |
| Acrolein | 0 | -- | -- | na | 9.3E+00 | -- | -- | na | 1.9E+01 | -- | -- | na | 9.3E-01 | -- | -- | na | 1.9E+00 | -- | -- | na | **1.9E+00** |
| Acrylonitrile [C] | 0 | -- | -- | na | 2.5E+00 | -- | -- | na | 5.0E+00 | -- | -- | na | 2.5E-01 | -- | -- | na | 5.0E-01 | -- | -- | na | **5.0E-01** |
| Aldrin [C] | 0 | 3.0E+00 | -- | na | 5.0E-04 | 6.0E+00 | -- | na | 1.0E-03 | 7.5E-01 | -- | na | 5.0E-05 | 1.5E+00 | -- | na | 1.0E-04 | **1.5E+00** | -- | na | **1.0E-04** |
| Ammonia-N (mg/l) (Yearly) | 0.044508 | 6.95E+00 | 1.71E+00 | na | -- | 1.4E+01 | 3.4E+00 | na | -- | 1.77E+00 | 4.60E-01 | na | -- | 3.5E+00 | 8.8E-01 | na | -- | **3.5E+00** | **8.8E-01** | na | -- |
| Ammonia-N (mg/l) (High Flow) | 0.044508 | 6.95E+00 | 9.69E-01 | na | -- | 1.4E+01 | 1.9E+00 | na | -- | 1.77E+00 | 2.76E-01 | na | -- | 3.5E+00 | 5.1E-01 | na | -- | **3.5E+00** | **5.1E-01** | na | -- |
| Anthracene | 0 | -- | -- | na | 4.0E+04 | -- | -- | na | 8.0E+04 | -- | -- | na | 4.0E+03 | -- | -- | na | 8.0E+03 | -- | -- | na | **8.0E+03** |
| Antimony | 0 | -- | -- | na | 6.4E+02 | -- | -- | na | 1.3E+03 | -- | -- | na | 6.4E+01 | -- | -- | na | 1.3E+02 | -- | -- | na | **1.3E+02** |
| Arsenic | 0.64 | 3.4E+02 | 1.5E+02 | na | -- | 6.8E+02 | 3.0E+02 | na | -- | 8.5E+01 | 3.8E+01 | na | -- | 1.7E+02 | 7.5E+01 | na | -- | **1.7E+02** | **7.5E+01** | na | -- |
| Barium | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Benzene [C] | 0 | -- | -- | na | 5.1E+02 | -- | -- | na | 1.0E+03 | -- | -- | na | 5.1E+01 | -- | -- | na | 1.0E+02 | -- | -- | na | **1.0E+02** |
| Benzidine [C] | 0 | -- | -- | na | 2.0E-03 | -- | -- | na | 4.0E-03 | -- | -- | na | 2.0E-04 | -- | -- | na | 4.0E-04 | -- | -- | na | **4.0E-04** |
| Benzo (a) anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 3.6E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | **3.6E-02** |
| Benzo (b) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 3.6E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | **3.6E-02** |
| Benzo (k) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 3.6E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | **3.6E-02** |
| Benzo (a) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 3.6E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | **3.6E-02** |
| Bis2-Chloroethyl Ether [C] | 0 | -- | -- | na | 5.3E+00 | -- | -- | na | 1.1E+01 | -- | -- | na | 5.3E-01 | -- | -- | na | 1.1E+00 | -- | -- | na | **1.1E+00** |
| Bis2-Chloroisopropyl Ether | 0 | -- | -- | na | 6.5E+04 | -- | -- | na | 1.3E+05 | -- | -- | na | 6.5E+03 | -- | -- | na | 1.3E+04 | -- | -- | na | **1.3E+04** |
| Bis 2-Ethylhexyl Phthalate [C] | 0 | -- | -- | na | 2.2E+01 | -- | -- | na | 4.4E+01 | -- | -- | na | 2.2E+00 | -- | -- | na | 4.4E+00 | -- | -- | na | **4.4E+00** |
| Bromoform [C] | 0 | -- | -- | na | 1.4E+03 | -- | -- | na | 2.8E+03 | -- | -- | na | 1.4E+02 | -- | -- | na | 2.8E+02 | -- | -- | na | **2.8E+02** |
| Butylbenzylphthalate | 0 | -- | -- | na | 1.9E+03 | -- | -- | na | 3.8E+03 | -- | -- | na | 1.9E+02 | -- | -- | na | 3.8E+02 | -- | -- | na | **3.8E+02** |
| Cadmium | 0.25 | 4.0E+00 | 1.1E+00 | na | -- | 7.7E+00 | 2.0E+00 | na | -- | 1.2E+00 | 4.7E-01 | na | -- | 2.1E+00 | 7.0E-01 | na | -- | **2.1E+00** | **7.0E-01** | na | -- |
| Carbon Tetrachloride [C] | p0+B10 | -- | -- | na | 1.6E+01 | -- | -- | na | 3.2E+01 | -- | -- | na | 1.6E+00 | -- | -- | na | 3.2E+00 | -- | -- | na | **3.2E+00** |
| Chlordane [C] | 0 | 2.4E+00 | 4.3E-03 | na | 8.1E-03 | 4.8E+00 | 8.6E-03 | na | 1.6E-02 | 6.0E-01 | 1.1E-03 | na | 8.1E-04 | 1.2E+00 | 2.2E-03 | na | 1.6E-03 | **1.2E+00** | **2.2E-03** | na | **1.6E-03** |
| Chloride | 46251.86 | 8.6E+05 | 2.3E+05 | na | -- | 1.7E+06 | 4.1E+05 | na | -- | 2.5E+05 | 9.2E+04 | na | -- | 4.5E+05 | 1.4E+05 | na | -- | **4.5E+05** | **1.4E+05** | na | -- |
| TRC | 0 | 1.9E+01 | 1.1E+01 | na | -- | 3.8E+01 | 2.2E+01 | na | -- | 4.8E+00 | 2.8E+00 | na | -- | 9.5E+00 | 5.5E+00 | na | -- | **9.5E+00** | **5.5E+00** | na | -- |
| Chlorobenzene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 3.2E+03 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.2E+02 | -- | -- | na | **3.2E+02** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Chlorodibromomethane[C] | 0 | -- | -- | na | 1.3E+02 | -- | -- | na | 2.6E+02 | -- | -- | na | 1.3E+01 | -- | -- | na | 2.6E+01 | -- | -- | na | **2.6E+01** |
| Chloroform | 0 | -- | -- | na | 1.1E+04 | -- | -- | na | 2.2E+04 | -- | -- | na | 1.1E+03 | -- | -- | na | 2.2E+03 | -- | -- | na | **2.2E+03** |
| 2-Chloronaphthalene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 3.2E+03 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.2E+02 | -- | -- | na | **3.2E+02** |
| 2-Chlorophenol | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.0E+02 | -- | -- | na | 1.5E+01 | -- | -- | na | 3.0E+01 | -- | -- | na | **3.0E+01** |
| Chlorpyrifos | 0 | 8.3E-02 | 4.1E-02 | na | -- | 1.7E-01 | 8.2E-02 | na | -- | 2.1E-02 | 1.0E-02 | na | -- | 4.2E-02 | 2.1E-02 | na | -- | **4.2E-02** | **2.1E-02** | na | -- |
| Chromium III | 0 | 5.7E+02 | 7.5E+01 | na | -- | 1.1E+03 | 1.5E+02 | na | -- | 1.4E+02 | 1.9E+01 | na | -- | 2.9E+02 | 3.7E+01 | na | -- | **2.9E+02** | **3.7E+01** | na | -- |
| Chromium VI | 0.276 | 1.6E+01 | 1.1E+01 | na | -- | 3.2E+01 | 2.2E+01 | na | -- | 4.2E+00 | 3.0E+00 | na | -- | 8.1E+00 | 5.6E+00 | na | -- | **8.1E+00** | **5.6E+00** | na | -- |
| Chromium, Total | 0 | -- | -- | 1.0E+02 | -- | -- | -- | na | -- | -- | -- | 1.0E+01 | -- | -- | -- | 2.0E+01 | -- | -- | -- | na | -- |
| Chrysene [C] | 0 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | 1.8E-03 | -- | -- | na | 3.6E-03 | -- | -- | na | **3.6E-03** |
| Copper | 2.49 | 1.4E+01 | 9.0E+00 | na | -- | 2.5E+01 | 1.6E+01 | na | -- | 5.3E+00 | 4.1E+00 | na | -- | 8.0E+00 | 5.8E+00 | na | -- | **8.0E+00** | **5.8E+00** | na | -- |
| Cyanide, Free | 0 | 2.2E+01 | 5.2E+00 | na | 1.6E+04 | 4.4E+01 | 1.0E+01 | na | 3.2E+04 | 5.5E+00 | 1.3E+00 | na | 1.6E+03 | 1.1E+01 | 2.6E+00 | na | 3.2E+03 | **1.1E+01** | **2.6E+00** | na | **3.2E+03** |
| DDD [C] | 0 | -- | -- | na | 3.1E-03 | -- | -- | na | 6.2E-03 | -- | -- | na | 3.1E-04 | -- | -- | na | 6.2E-04 | -- | -- | na | **6.2E-04** |
| DDE [C] | 0 | -- | -- | na | 2.2E-03 | -- | -- | na | 4.4E-03 | -- | -- | na | 2.2E-04 | -- | -- | na | 4.4E-04 | -- | -- | na | **4.4E-04** |
| DDT [C] | 0 | 1.1E+00 | 1.0E-03 | na | 2.2E-03 | 2.2E+00 | 2.0E-03 | na | 4.4E-03 | 2.8E-01 | 2.5E-04 | na | 2.2E-04 | 5.5E-01 | 5.0E-04 | na | 4.4E-04 | **5.5E-01** | **5.0E-04** | na | **4.4E-04** |
| Demeton | 0 | -- | 1.0E-01 | na | -- | -- | 2.0E-01 | na | -- | -- | 2.5E-02 | na | -- | -- | 5.0E-02 | na | -- | -- | **5.0E-02** | na | -- |
| Diazinon | 0 | 1.7E-01 | 1.7E-01 | na | -- | 3.4E-01 | 3.4E-01 | na | -- | 4.3E-02 | 4.3E-02 | na | -- | 8.5E-02 | 8.5E-02 | na | -- | **8.5E-02** | **8.5E-02** | na | -- |
| Dibenz(a,h)anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 3.6E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | **3.6E-02** |
| 1,2-Dichlorobenzene | 0 | -- | -- | na | 1.3E+03 | -- | -- | na | 2.6E+03 | -- | -- | na | 1.3E+02 | -- | -- | na | 2.6E+02 | -- | -- | na | **2.6E+02** |
| 1,3-Dichlorobenzene | 0 | -- | -- | na | 9.6E+02 | -- | -- | na | 1.9E+03 | -- | -- | na | 9.6E+01 | -- | -- | na | 1.9E+02 | -- | -- | na | **1.9E+02** |
| 1,4-Dichlorobenzene | 0 | -- | -- | na | 1.9E+02 | -- | -- | na | 3.8E+02 | -- | -- | na | 1.9E+01 | -- | -- | na | 3.8E+01 | -- | -- | na | **3.8E+01** |
| 3,3-Dichlorobenzidine [C] | 0 | -- | -- | na | 2.8E-01 | -- | -- | na | 5.6E-01 | -- | -- | na | 2.8E-02 | -- | -- | na | 5.6E-02 | -- | -- | na | **5.6E-02** |
| Dichlorobromomethane [C] | 0 | -- | -- | na | 1.7E+02 | -- | -- | na | 3.4E+02 | -- | -- | na | 1.7E+01 | -- | -- | na | 3.4E+01 | -- | -- | na | **3.4E+01** |
| 1,2-Dichloroethane [C] | 0 | -- | -- | na | 3.7E+02 | -- | -- | na | 7.4E+02 | -- | -- | na | 3.7E+01 | -- | -- | na | 7.4E+01 | -- | -- | na | **7.4E+01** |
| 1,1-Dichloroethylene | 0 | -- | -- | na | 7.1E+03 | -- | -- | na | 1.4E+04 | -- | -- | na | 7.1E+02 | -- | -- | na | 1.4E+03 | -- | -- | na | **1.4E+03** |
| 1,2-trans-dichloroethylene | 0 | -- | -- | na | 1.0E+04 | -- | -- | na | 2.0E+04 | -- | -- | na | 1.0E+03 | -- | -- | na | 2.0E+03 | -- | -- | na | **2.0E+03** |
| 2,4-Dichlorophenol | 0 | -- | -- | na | 2.9E+02 | -- | -- | na | 5.8E+02 | -- | -- | na | 2.9E+01 | -- | -- | na | 5.8E+01 | -- | -- | na | **5.8E+01** |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| 1,2-Dichloropropane [C] | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.0E+02 | -- | -- | na | 1.5E+01 | -- | -- | na | 3.0E+01 | -- | -- | na | **3.0E+01** |
| 1,3-Dichloropropene [C] | 0 | -- | -- | na | 2.1E+02 | -- | -- | na | 4.2E+02 | -- | -- | na | 2.1E+01 | -- | -- | na | 4.2E+01 | -- | -- | na | **4.2E+01** |
| Dieldrin [C] | 0 | 2.4E-01 | 5.6E-02 | na | 5.4E-04 | 4.8E-01 | 1.1E-01 | na | 1.1E-03 | 6.0E-02 | 1.4E-02 | na | 5.4E-03 | 1.2E-01 | 2.8E-02 | na | 1.1E-04 | **1.2E-01** | **2.8E-02** | na | **1.1E-04** |
| Diethyl Phthalate | 0 | -- | -- | na | 4.4E+04 | -- | -- | na | 8.8E+04 | -- | -- | na | 4.4E+03 | -- | -- | na | 8.8E+03 | -- | -- | na | **8.8E+03** |
| 2,4-Dimethylphenol | 0 | -- | -- | na | 8.5E+02 | -- | -- | na | 1.7E+03 | -- | -- | na | 8.5E+01 | -- | -- | na | 1.7E+02 | -- | -- | na | **1.7E+02** |
| Dimethyl Phthalate | 0 | -- | -- | na | 1.1E+06 | -- | -- | na | 2.2E+06 | -- | -- | na | 1.1E+05 | -- | -- | na | 2.2E+05 | -- | -- | na | **2.2E+05** |
| Di-n-Butyl Phthalate | 0 | -- | -- | na | 4.5E+03 | -- | -- | na | 9.0E+03 | -- | -- | na | 4.5E+02 | -- | -- | na | 9.0E+02 | -- | -- | na | **9.0E+02** |
| 2,4 Dinitrophenol | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.1E+04 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.1E+03 | -- | -- | na | **1.1E+03** |
| 2-Methyl-4,6-Dinitrophenol | 0 | -- | -- | na | 2.8E+02 | -- | -- | na | 5.6E+02 | -- | -- | na | 2.8E+01 | -- | -- | na | 5.6E+01 | -- | -- | na | **5.6E+01** |
| 2,4-Dinitrotoluene [C] | 0 | -- | -- | na | 3.4E+01 | -- | -- | na | 6.8E+01 | -- | -- | na | 3.4E+00 | -- | -- | na | 6.8E+00 | -- | -- | na | **6.8E+00** |
| Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin | 0 | -- | -- | na | 5.1E-08 | -- | -- | na | 1.0E-07 | -- | -- | na | 5.1E-09 | -- | -- | na | 1.0E-08 | -- | -- | na | **1.0E-08** |
| 1,2-Diphenylhydrazine [C] | 0 | -- | -- | na | 2.0E+00 | -- | -- | na | 4.0E+00 | -- | -- | na | 2.0E-01 | -- | -- | na | 4.0E-01 | -- | -- | na | **4.0E-01** |
| Alpha-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 4.4E-01 | 1.1E-01 | na | 1.8E+02 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 1.1E-01 | 2.8E-02 | na | 1.8E+01 | **1.1E-01** | **2.8E-02** | na | **1.8E+01** |
| Beta-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 4.4E-01 | 1.1E-01 | na | 1.8E+02 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 1.1E-01 | 2.8E-02 | na | 1.8E+01 | **1.1E-01** | **2.8E-02** | na | **1.8E+01** |
| Alpha + Beta Endosulfan | 0 | 2.2E-01 | 5.6E-02 | -- | -- | 4.4E-01 | 1.1E-01 | -- | -- | 5.5E-02 | 1.4E-02 | -- | -- | 1.1E-01 | 2.8E-02 | -- | -- | **1.1E-01** | **2.8E-02** | -- | -- |
| Endosulfan Sulfate | 0 | -- | -- | na | 8.9E+01 | -- | -- | na | 1.8E+02 | -- | -- | na | 8.9E+00 | -- | -- | na | 1.8E+01 | -- | -- | na | **1.8E+01** |
| Endrin | 0 | 8.6E-02 | 3.6E-02 | na | 6.0E-02 | 1.7E-01 | 7.2E-02 | na | 1.2E-01 | 2.2E-02 | 9.0E-03 | na | 6.0E-03 | 4.3E-02 | 1.8E-02 | na | 1.2E-02 | **4.3E-02** | **1.8E-02** | na | **1.2E-02** |
| Endrin Aldehyde | 0 | -- | -- | na | 3.0E-01 | -- | -- | na | 6.0E-01 | -- | -- | na | 3.0E-02 | -- | -- | na | 6.0E-02 | -- | -- | na | **6.0E-02** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Ethylbenzene | 0 | -- | -- | na | 2.1E+03 | -- | -- | na | 4.2E+03 | -- | -- | na | 2.1E+02 | -- | -- | na | 4.2E+02 | -- | -- | na | **4.2E+02** |
| Fluoranthene | 0 | -- | -- | na | 1.4E+02 | -- | -- | na | 2.8E+02 | -- | -- | na | 1.4E+01 | -- | -- | na | 2.8E+01 | -- | -- | na | **2.8E+01** |
| Fluorene | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.1E+04 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.1E+03 | -- | -- | na | **1.1E+03** |
| Foaming Agents | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Guthion | 0 | -- | 1.0E-02 | na | -- | -- | 2.0E-02 | na | -- | -- | 2.5E-03 | na | -- | -- | 5.0E-03 | na | -- | -- | **5.0E-03** | na | -- |
| Heptachlor [c] | 0 | 5.2E-01 | 3.8E-03 | na | 7.9E-04 | 1.0E+00 | 7.6E-03 | na | 1.6E-03 | 1.3E-01 | 9.5E-04 | na | 7.9E-05 | 2.6E-01 | 1.9E-03 | na | 1.6E-04 | **2.6E-01** | **1.9E-03** | na | **1.6E-04** |
| Heptachlor Epoxide[c] | 0 | 5.2E-01 | 3.8E-03 | na | 3.9E-04 | 1.0E+00 | 7.6E-03 | na | 7.8E-04 | 1.3E-01 | 9.5E-04 | na | 3.9E-05 | 2.6E-01 | 1.9E-03 | na | 7.8E-05 | **2.6E-01** | **1.9E-03** | na | **7.8E-05** |
| Hexachlorobenzene[c] | 0 | -- | -- | na | 2.9E-03 | -- | -- | na | 5.8E-03 | -- | -- | na | 2.9E-04 | -- | -- | na | 5.8E-04 | -- | -- | na | **5.8E-04** |
| Hexachlorobutadiene[c] | 0 | -- | -- | na | 1.8E+02 | -- | -- | na | 3.6E+02 | -- | -- | na | 1.8E+01 | -- | -- | na | 3.6E+01 | -- | -- | na | **3.6E+01** |
| Hexachlorocyclohexane Alpha-BHC[c] | 0 | -- | -- | na | 4.9E-02 | -- | -- | na | 9.8E-02 | -- | -- | na | 4.9E-03 | -- | -- | na | 9.8E-03 | -- | -- | na | **9.8E-03** |
| Hexachlorocyclohexane Beta-BHC[c] | 0 | -- | -- | na | 1.7E-01 | -- | -- | na | 3.4E-01 | -- | -- | na | 1.7E-02 | -- | -- | na | 3.4E-02 | -- | -- | na | **3.4E-02** |
| Hexachlorocyclohexane Gamma-BHC[c] (Lindane) | 0 | 9.5E-01 | na | na | 1.8E+00 | 1.9E+00 | -- | na | 3.6E+00 | 2.4E-01 | -- | na | 1.8E-01 | 4.8E-01 | -- | na | 3.6E-01 | **4.8E-01** | -- | na | **3.6E-01** |
| Hexachlorocyclopentadiene | 0 | -- | -- | na | 1.1E+03 | -- | -- | na | 2.2E+03 | -- | -- | na | 1.1E+02 | -- | -- | na | 2.2E+02 | -- | -- | na | **2.2E+02** |
| Hexachloroethane[c] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 6.6E+01 | -- | -- | na | 3.3E+00 | -- | -- | na | 6.6E+00 | -- | -- | na | **6.6E+00** |
| Hydrogen Sulfide | 0 | -- | 2.0E+00 | na | -- | -- | 4.0E+00 | na | -- | -- | 5.0E-01 | na | -- | -- | 1.0E+00 | na | -- | -- | **1.0E+00** | na | -- |
| Indeno (1,2,3-cd) pyrene [c] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 3.6E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 3.6E-02 | -- | -- | na | **3.6E-02** |
| Iron | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Isophorone[c] | 0 | -- | -- | na | 9.6E+03 | -- | -- | na | 1.9E+04 | -- | -- | na | 9.6E+02 | -- | -- | na | 1.9E+03 | -- | -- | na | **1.9E+03** |
| Kepone | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | -- |
| Lead | 2.09 | 1.2E+02 | 1.4E+01 | na | -- | 2.4E+02 | 2.5E+01 | na | -- | 3.2E+01 | 5.0E+00 | na | -- | 6.1E+01 | 7.9E+00 | na | -- | **6.1E+01** | **7.9E+00** | na | -- |
| Malathion | 0 | -- | 1.0E-01 | na | -- | -- | 2.0E-01 | na | -- | -- | 2.5E-02 | na | -- | -- | 5.0E-02 | na | -- | -- | **5.0E-02** | na | -- |
| Manganese | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Mercury | | 1.4E+00 | 7.7E-01 | -- | -- | 2.8E+00 | 1.5E+00 | -- | -- | 3.5E-01 | 1.9E-01 | -- | -- | 7.0E-01 | 3.9E-01 | -- | -- | **7.0E-01** | **3.9E-01** | -- | -- |
| Methyl Bromide | 0 | -- | -- | na | 1.5E+03 | -- | -- | na | 3.0E+03 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.0E+02 | -- | -- | na | **3.0E+02** |
| Methylene Chloride [c] | 0 | -- | -- | na | 5.9E+03 | -- | -- | na | 1.2E+04 | -- | -- | na | 5.9E+02 | -- | -- | na | 1.2E+03 | -- | -- | na | **1.2E+03** |
| Methoxychlor | 0 | -- | 3.0E-02 | na | -- | -- | 6.0E-02 | na | -- | -- | 7.5E-03 | na | -- | -- | 1.5E-02 | na | -- | -- | **1.5E-02** | na | -- |
| Mirex | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | -- |
| Nickel | 4.6 | 1.8E+02 | 2.0E+01 | na | 4.6E+03 | 3.6E+02 | 3.6E+01 | na | 9.2E+03 | 4.9E+01 | 8.6E+00 | na | 4.6E+02 | 9.4E+01 | 1.3E+01 | na | 9.2E+02 | **9.4E+01** | **1.3E+01** | na | **9.2E+02** |
| Nitrate (as N) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Nitrobenzene | 0 | -- | -- | na | 6.9E+02 | -- | -- | na | 1.4E+03 | -- | -- | na | 6.9E+01 | -- | -- | na | 1.4E+02 | -- | -- | na | **1.4E+02** |
| N-Nitrosodimethylamine[c] | 0 | -- | -- | na | 3.0E+01 | -- | -- | na | 6.0E+01 | -- | -- | na | 3.0E+00 | -- | -- | na | 6.0E+00 | -- | -- | na | **6.0E+00** |
| N-Nitrosodiphenylamine[c] | 0 | -- | -- | na | 6.0E+01 | -- | -- | na | 1.2E+02 | -- | -- | na | 6.0E+00 | -- | -- | na | 1.2E+01 | -- | -- | na | **1.2E+01** |
| N-Nitrosodi-n-propylamine[c] | 0 | -- | -- | na | 5.1E+00 | -- | -- | na | 1.0E+01 | -- | -- | na | 5.1E-01 | -- | -- | na | 1.0E+00 | -- | -- | na | **1.0E+00** |
| Nonylphenol | 0 | 2.8E+01 | 6.6E+00 | -- | -- | 5.6E+01 | 1.3E+01 | na | -- | 7.0E+00 | 1.7E+00 | -- | -- | 1.4E+01 | 3.3E+00 | -- | -- | **1.4E+01** | **3.3E+00** | na | -- |
| Parathion | 0 | 6.5E-02 | 1.3E-02 | na | -- | 1.3E-01 | 2.6E-02 | na | -- | 1.6E-02 | 3.3E-03 | na | -- | 3.3E-02 | 6.5E-03 | na | -- | **3.3E-02** | **6.5E-03** | na | -- |
| PCB Total[c] | 0 | -- | 1.4E-02 | na | 6.4E-04 | -- | 2.8E-02 | na | 1.3E-03 | -- | 3.5E-03 | na | 6.4E-05 | -- | 7.0E-03 | na | 1.3E-04 | -- | **7.0E-03** | na | **1.3E-04** |
| Pentachlorophenol [c] | 0 | 1.3E+01 | 1.0E+01 | na | 3.0E+01 | 2.6E+01 | 2.0E+01 | na | 6.0E+01 | 3.3E+00 | 2.5E+00 | na | 3.0E+00 | 6.5E+00 | 5.0E+00 | na | 6.0E+00 | **6.5E+00** | **5.0E+00** | na | **6.0E+00** |
| Phenol | 0 | -- | -- | na | 8.6E+05 | -- | -- | na | 1.7E+06 | -- | -- | na | 8.6E+04 | -- | -- | na | 1.7E+05 | -- | -- | na | **1.7E+05** |
| Pyrene | 0 | -- | -- | na | 4.0E+03 | -- | -- | na | 8.0E+03 | -- | -- | na | 4.0E+02 | -- | -- | na | 8.0E+02 | -- | -- | na | **8.0E+02** |
| Radionuclides | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Gross Alpha Activity (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Beta and Photon Activity (mrem/yr) | 0 | -- | -- | na | 4.0E+00 | -- | -- | na | 8.0E+00 | -- | -- | na | 4.0E-01 | -- | -- | na | 8.0E-01 | -- | -- | na | **8.0E-01** |
| Radium 226 + 228 (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Uranium (ug/l) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Selenium, Total Recoverable | 0.835 | 2.0E+01 | 5.0E+00 | na | 4.2E+03 | 3.9E+01 | 9.2E+00 | na | 8.4E+03 | 5.6E+00 | 1.9E+00 | na | 4.2E+02 | 1.0E+01 | 2.9E+00 | na | 8.4E+02 | **1.0E+01** | **2.9E+00** | **na** | **8.4E+02** |
| Silver | 1.057 | 3.5E+00 | -- | na | -- | 6.0E+00 | -- | na | -- | 1.7E+00 | -- | na | -- | 2.3E+00 | -- | na | -- | **2.3E+00** | **--** | **na** | **--** |
| Sulfate | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| 1,1,2,2-Tetrachloroethane[C] | 0 | -- | -- | na | 4.0E+01 | -- | -- | na | 8.0E+01 | -- | -- | na | 4.0E+00 | -- | -- | na | 8.0E+00 | **--** | **--** | **na** | **8.0E+00** |
| Tetrachloroethylene[C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 6.6E+01 | -- | -- | na | 3.3E+00 | -- | -- | na | 6.6E+00 | **--** | **--** | **na** | **6.6E+00** |
| Thallium | 0 | -- | -- | na | 4.7E-01 | -- | -- | na | 9.4E-01 | -- | -- | na | 4.7E-02 | -- | -- | na | 9.4E-02 | **--** | **--** | **na** | **9.4E-02** |
| Toluene | 0 | -- | -- | na | 6.0E+03 | -- | -- | na | 1.2E+04 | -- | -- | na | 6.0E+02 | -- | -- | na | 1.2E+03 | **--** | **--** | **na** | **1.2E+03** |
| Total dissolved solids | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Toxaphene [C] | 0 | 7.3E-01 | 2.0E-04 | na | 2.8E-03 | 1.5E+00 | 4.0E-04 | na | 5.6E-03 | 1.8E-01 | 5.0E-05 | na | 2.8E-04 | 3.7E-01 | 1.0E-04 | na | 5.6E-04 | **3.7E-01** | **1.0E-04** | **na** | **5.6E-04** |
| Tributyltin | 0 | 4.6E-01 | 7.2E-02 | na | -- | 9.2E-01 | 1.4E-01 | na | -- | 1.2E-01 | 1.8E-02 | na | -- | 2.3E-01 | 3.6E-02 | na | -- | **2.3E-01** | **3.6E-02** | **na** | **--** |
| 1,2,4-Trichlorobenzene | 0 | -- | -- | na | 7.0E+01 | -- | -- | na | 1.4E+02 | -- | -- | na | 7.0E+00 | -- | -- | na | 1.4E+01 | **--** | **--** | **na** | **1.4E+01** |
| 1,1,2-Trichloroethane[C] | 0 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.2E+02 | -- | -- | na | 1.6E+01 | -- | -- | na | 3.2E+01 | **--** | **--** | **na** | **3.2E+01** |
| Trichloroethylene [C] | 0 | -- | -- | na | 3.0E+02 | -- | -- | na | 6.0E+02 | -- | -- | na | 3.0E+01 | -- | -- | na | 6.0E+01 | **--** | **--** | **na** | **6.0E+01** |
| 2,4,6-Trichlorophenol [C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 4.8E+01 | -- | -- | na | 2.4E+00 | -- | -- | na | 4.8E+00 | **--** | **--** | **na** | **4.8E+00** |
| 2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Vinyl Chloride[C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 4.8E+01 | -- | -- | na | 2.4E+00 | -- | -- | na | 4.8E+00 | **--** | **--** | **na** | **4.8E+00** |
| Zinc | 18.45 | 1.2E+02 | 1.2E+02 | na | 2.6E+04 | 2.2E+02 | 2.2E+02 | na | 5.2E+04 | 4.3E+01 | 4.4E+01 | na | 2.6E+03 | 6.8E+01 | 6.9E+01 | na | 5.2E+03 | **6.8E+01** | **6.9E+01** | **na** | **5.2E+03** |

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

| Metal | Target Value (SSTV) |
|---|---|
| Antimony | 1.3E+02 |
| Arsenic | 4.5E+01 |
| Barium | na |
| Cadmium | 4.2E-01 |
| Chromium III | 2.2E+01 |
| Chromium VI | 3.3E+00 |
| Copper | 3.2E+00 |
| Iron | na |
| Lead | 4.7E+00 |
| Manganese | na |
| Mercury | 2.3E-01 |
| Nickel | 7.5E+00 |
| Selenium | 1.8E+00 |
| Silver | 9.1E-01 |
| Zinc | 2.7E+01 |

Note: do not use QL's lower than the minimum QL's provided in agency guidance

## 1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

| | Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 1.000 | 1.000 | 2.000 | 2.000 |
| 7Q10 | 1.000 | N/A | 2.000 | N/A |
| 30Q10 | 1.000 | 1.000 | 2.000 | 2.000 |
| 30Q5 | 1.000 | N/A | 2.000 | N/A |
| Harm. Mean | 1.000 | N/A | 2.000 | N/A |
| Annual Avg. | 0.000 | N/A | 1.000 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 17.700 | 26.500 |
| 30Q10 90th% Temp. Mix (deg C) | 17.700 | 26.500 |
| 1Q10 90th% pH Mix (SU) | 8.100 | 8.100 |
| 30Q10 90th% pH Mix (SU) | 8.100 | 8.100 |
| 1Q10 10th% pH Mix (SU) | 7.400 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.400 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) | 101.0 | 101.0 |
| 7Q10 Hardness (mg/L as CaCO3) | 101.0 | 101.0 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.100 |
| (7.204 - pH) | -0.896 |
| (pH - 7.204) | 0.896 |
| Trout Present Criterion (mg N/l | 4.641 |
| Trout Absent Criterion (mg N/L | 6.948 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 6.948 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 17.700 |
| 90th Percentile pH (SU) | 8.100 |
| MIN | 2.321 |
| MAX | 17.700 |
| (7.688 - pH) | -0.412 |
| (pH - 7.688) | 0.412 |
| Early LS Present Criterion (mg N | 1.708 |
| Early LS Absent Criterion (mg N/ | 1.708 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 1.708 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.100 |
| (7.204 - pH) | -0.896 |
| (pH - 7.204) | 0.896 |
| Trout Present Criterion (mg N/l | 4.641 |
| Trout Absent Criterion (mg N/L | 6.948 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 6.948 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 26.500 |
| 90th Percentile pH (SU) | 8.100 |
| MIN | 1.316 |
| MAX | 26.500 |
| (7.688 - pH) | -0.412 |
| (pH - 7.688) | 0.412 |
| Early LS Present Criterion (mg N | 0.969 |
| Early LS Absent Criterion (mg N/ | 0.969 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.969 |

## 1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

| | 100% Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 1.000 | 1.000 | 2.000 | 2.000 |
| 7Q10 | 1.000 | N/A | 2.000 | N/A |
| 30Q10 | 1.000 | 1.000 | 2.000 | 2.000 |
| 30Q5 | 1.000 | N/A | 2.000 | N/A |
| Harm. Mean | 1.000 | N/A | 2.000 | N/A |
| Annual Avg. | 0.000 | N/A | 1.000 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 17.700 | 26.500 |
| 30Q10 90th% Temp. Mix (deg C) | 17.700 | 26.500 |
| 1Q10 90th% pH Mix (SU) | 8.100 | 8.100 |
| 30Q10 90th% pH Mix (SU) | 8.100 | 8.100 |
| 1Q10 10th% pH Mix (SU) | 7.400 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.400 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) = | 101.000 | 101.000 |
| 7Q10 Hardness (mg/L as CaCO3) = | 101.000 | 101.000 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.100 |
| (7.204 - pH) | -0.896 |
| (pH - 7.204) | 0.896 |
| Trout Present Criterion (mg N/l | 4.641 |
| Trout Absent Criterion (mg N/L | 6.948 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 6.948 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 17.700 |
| 90th Percentile pH (SU) | 8.100 |
| MIN | 2.321 |
| MAX | 17.700 |
| (7.688 - pH) | -0.412 |
| (pH - 7.688) | 0.412 |
| Early LS Present Criterion (mg N | 1.708 |
| Early LS Absent Criterion (mg N/ | 1.708 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 1.708 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.100 |
| (7.204 - pH) | -0.896 |
| (pH - 7.204) | 0.896 |
| Trout Present Criterion (mg N/l | 4.641 |
| Trout Absent Criterion (mg N/L | 6.948 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 6.948 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 26.500 |
| 90th Percentile pH (SU) | 8.100 |
| MIN | 1.316 |
| MAX | 26.500 |
| (7.688 - pH) | -0.412 |
| (pH - 7.688) | 0.412 |
| Early LS Present Criterion (mg N | 0.969 |
| Early LS Absent Criterion (mg N/ | 0.969 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.969 |

# Outfall 002

# FRESHWATER
# WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (Outfall 002)  Permit No.: VA0003026

Receiving Stream: James River  Version: OWP Guidance Memo 00-2011 (8/24/00)

**Stream Information**

| | | |
|---|---|---|
| Mean Hardness (as CaCO3) = | 104 | mg/L |
| 90% Temperature (Annual) = | 27 | deg C |
| 90% Temperature (Wet season) = | 25 | deg C |
| 90% Maximum pH = | 8.7 | SU |
| 10% Maximum pH = | 7.3 | SU |
| Tier Designation (1 or 2) = | 2 | |
| Public Water Supply (PWS) Y/N? = | n | |
| Trout Present Y/N? = | n | |
| Early Life Stages Present Y/N? = | y | |

**Stream Flows**

| | | |
|---|---|---|
| 1Q10 (Annual) = | 199 | MGD |
| 7Q10 (Annual) = | 254 | MGD |
| 30Q10 (Annual) = | 293 | MGD |
| 1Q10 (Wet season) = | 464 | MGD |
| 30Q10 (Wet season) | 662 | MGD |
| 30Q5 = | 335 | MGD |
| Harmonic Mean = | 961 | MGD |

**Mixing Information**

| | | |
|---|---|---|
| Annual - 1Q10 Mix = | 0.7 | % |
| - 7Q10 Mix = | 41.77 | % |
| - 30Q10 Mix = | 47.38 | % |
| Wet Season - 1Q10 Mix = | 100 | % |
| - 30Q10 Mix = | 100 | % |

**Effluent Information**

| | | |
|---|---|---|
| Mean Hardness (as CaCO3) = | 96 | mg/L |
| 90% Temp (Annual) = | 38 | deg C |
| 90% Temp (Wet season) = | 34 | deg C |
| 90% Maximum pH = | 8.2 | SU |
| 10% Maximum pH = | 7.3 | SU |
| Discharge Flow = | 6.15 | MGD |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Acenapthene | 0 | -- | -- | na | 9.9E+02 | -- | -- | na | 5.5E+04 | -- | -- | na | 9.9E+01 | -- | -- | na | 5.5E+03 | -- | -- | na | 5.5E+03 |
| Acrolein | 0 | -- | -- | na | 9.3E+00 | -- | -- | na | 5.2E+02 | -- | -- | na | 9.3E-01 | -- | -- | na | 5.2E+01 | -- | -- | na | 5.2E+01 |
| Acrylonitrile [C] | 0 | -- | -- | na | 2.5E+00 | -- | -- | na | 3.9E+02 | -- | -- | na | 2.5E-01 | -- | -- | na | 3.9E+01 | -- | -- | na | 3.9E+01 |
| Aldrin [C] | 0 | 3.0E+00 | -- | na | 5.0E-04 | 3.7E+00 | -- | na | 7.9E-02 | 7.5E-01 | -- | na | 5.0E-05 | 2.5E+01 | -- | na | 7.9E-03 | **3.7E+00** | -- | na | 7.9E-03 |
| Ammonia-N (mg/l) (Yearly) | 0.044508 | 5.11E+00 | 3.60E-01 | na | -- | 6.3E+00 | 7.5E+00 | na | -- | 6.13E-01 | 1.22E-01 | na | -- | 1.9E+01 | 3.8E+00 | na | -- | **6.3E+00** | **3.8E+00** | na | -- |
| Ammonia-N (mg/l) (High Flow) | 0.044508 | 2.25E+00 | 3.99E-01 | na | -- | 1.7E+02 | 3.9E+01 | na | -- | 5.97E-01 | 1.33E-01 | na | -- | 4.2E+01 | 9.7E+00 | na | -- | **4.2E+01** | **9.7E+00** | na | -- |
| Anthracene | 0 | -- | -- | na | 4.0E+04 | -- | -- | na | 2.2E+06 | -- | -- | na | 4.0E+03 | -- | -- | na | 2.2E+05 | -- | -- | na | 2.2E+05 |
| Antimony | 0 | -- | -- | na | 6.4E+02 | -- | -- | na | 3.6E+04 | -- | -- | na | 6.4E+01 | -- | -- | na | 3.6E+03 | -- | -- | na | 3.6E+03 |
| Arsenic | 0.64 | 3.4E+02 | 1.5E+02 | na | -- | 4.2E+02 | 2.7E+03 | na | -- | 8.5E+01 | 3.8E+01 | na | -- | 2.8E+03 | 1.6E+03 | na | -- | **4.2E+02** | **1.6E+03** | na | -- |
| Barium | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Benzene [C] | 0 | -- | -- | na | 5.1E+02 | -- | -- | na | 8.0E+04 | -- | -- | na | 5.1E+01 | -- | -- | na | 8.0E+03 | -- | -- | na | 8.0E+03 |
| Benzidine [C] | 0 | -- | -- | na | 2.0E-03 | -- | -- | na | 3.1E-01 | -- | -- | na | 2.0E-04 | -- | -- | na | 3.1E-02 | -- | -- | na | 3.1E-02 |
| Benzo (a) anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | 2.8E+00 |
| Benzo (b) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | 2.8E+00 |
| Benzo (k) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | 2.8E+00 |
| Benzo (a) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | 2.8E+00 |
| Bis2-Chloroethyl Ether [C] | 0 | -- | -- | na | 5.3E+00 | -- | -- | na | 8.3E+02 | -- | -- | na | 5.3E-01 | -- | -- | na | 8.3E+01 | -- | -- | na | 8.3E+01 |
| Bis2-Chloroisopropyl Ether | 0 | -- | -- | na | 6.5E+04 | -- | -- | na | 3.6E+06 | -- | -- | na | 6.5E+03 | -- | -- | na | 3.6E+05 | -- | -- | na | 3.6E+05 |
| Bis 2-Ethylhexyl Phthalate [C] | 0 | -- | -- | na | 2.2E+01 | -- | -- | na | 3.5E+03 | -- | -- | na | 2.2E+00 | -- | -- | na | 3.5E+02 | -- | -- | na | 3.5E+02 |
| Bromoform [C] | 0 | -- | -- | na | 1.4E+03 | -- | -- | na | 2.2E+05 | -- | -- | na | 1.4E+02 | -- | -- | na | 2.2E+04 | -- | -- | na | 2.2E+04 |
| Butylbenzylphthalate | 0 | -- | -- | na | 1.9E+03 | -- | -- | na | 1.1E+05 | -- | -- | na | 1.9E+02 | -- | -- | na | 1.1E+04 | -- | -- | na | 1.1E+04 |
| Cadmium | 0.25 | 3.8E+00 | 1.2E+00 | na | -- | 4.6E+00 | 1.7E+01 | na | -- | 1.2E+00 | 4.8E-01 | na | -- | 3.2E+01 | 1.0E+01 | na | -- | **4.6E+00** | **1.0E+01** | na | -- |
| Carbon Tetrachloride [C] | p0+B10 | -- | -- | na | 1.6E+01 | -- | -- | na | 2.5E+03 | -- | -- | na | 1.6E+00 | -- | -- | na | 2.5E+02 | -- | -- | na | 2.5E+02 |
| Chlordane [C] | 0 | 2.4E+00 | 4.3E-03 | na | 8.1E-03 | 2.9E+00 | 7.8E-02 | na | 1.3E+00 | 6.0E-01 | 1.1E-03 | na | 8.1E-04 | 2.0E+01 | 4.5E-02 | na | 1.3E-01 | **2.9E+00** | **4.5E-02** | na | 1.3E-01 |
| Chloride | 46251.86 | 8.6E+05 | 2.3E+05 | na | -- | 1.0E+06 | 3.4E+06 | na | -- | 2.5E+05 | 9.2E+04 | na | -- | 6.8E+06 | 2.0E+06 | na | -- | **1.0E+06** | **2.0E+06** | na | -- |
| TRC | 0 | 1.9E+01 | 1.1E+01 | na | -- | 2.3E+01 | 2.0E+02 | na | -- | 4.8E+00 | 2.8E+00 | na | -- | 1.6E+02 | 1.2E+02 | na | -- | **2.3E+01** | **1.2E+02** | na | -- |
| Chlorobenzene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 8.9E+04 | -- | -- | na | 1.6E+02 | -- | -- | na | 8.9E+03 | -- | -- | na | 8.9E+03 |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Chlorodibromomethane[C] | 0 | -- | -- | na | 1.3E+02 | -- | -- | na | 2.0E+04 | -- | -- | na | 1.3E+01 | -- | -- | na | 2.0E+03 | -- | -- | na | **2.0E+03** |
| Chloroform | 0 | -- | -- | na | 1.1E+04 | -- | -- | na | 6.1E+05 | -- | -- | na | 1.1E+03 | -- | -- | na | 6.1E+04 | -- | -- | na | **6.1E+04** |
| 2-Chloronaphthalene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 8.9E+04 | -- | -- | na | 1.6E+02 | -- | -- | na | 8.9E+03 | -- | -- | na | **8.9E+03** |
| 2-Chlorophenol | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 8.3E+03 | -- | -- | na | 1.5E+01 | -- | -- | na | 8.3E+02 | -- | -- | na | **8.3E+02** |
| Chlorpyrifos | 0 | 8.3E-02 | 4.1E-02 | na | -- | 1.0E-01 | 7.5E-01 | na | -- | 2.1E-02 | 1.0E-02 | na | -- | 6.9E-01 | 4.3E-01 | na | -- | **1.0E-01** | **4.3E-01** | na | -- |
| Chromium III | 0 | 5.6E+02 | 7.6E+01 | na | -- | 6.8E+02 | 1.4E+03 | na | -- | 1.5E+02 | 1.9E+01 | na | -- | 4.9E+03 | 8.1E+02 | na | -- | **6.8E+02** | **8.1E+02** | na | -- |
| Chromium VI | 0.276 | 1.6E+01 | 1.1E+01 | na | -- | 2.0E+01 | 2.0E+02 | na | -- | 4.2E+00 | 3.0E+00 | na | -- | 1.3E+02 | 1.1E+02 | na | -- | **2.0E+01** | **1.1E+02** | na | -- |
| Chromium, Total | 0 | -- | -- | 1.0E+02 | -- | -- | -- | na | -- | -- | -- | 1.0E+01 | -- | -- | -- | 5.5E+02 | -- | -- | -- | na | -- |
| Chrysene [C] | 0 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | 1.8E-03 | -- | -- | na | 2.8E-01 | -- | -- | na | **2.8E-01** |
| Copper | 2.49 | 1.3E+01 | 9.2E+00 | na | -- | 1.6E+01 | 1.3E+02 | na | -- | 5.3E+00 | 4.2E+00 | na | -- | 9.8E+01 | 7.4E+01 | na | -- | **1.6E+01** | **7.4E+01** | na | -- |
| Cyanide, Free | 0 | 2.2E+01 | 5.2E+00 | na | 1.6E+04 | 2.7E+01 | 9.5E+01 | na | 8.9E+05 | 5.5E+00 | 1.3E+00 | na | 1.6E+03 | 1.8E+02 | 5.5E+01 | na | 8.9E+04 | **2.7E+01** | **5.5E+01** | na | **8.9E+04** |
| DDD [C] | 0 | -- | -- | na | 3.1E-03 | -- | -- | na | 4.9E-01 | -- | -- | na | 3.1E-04 | -- | -- | na | 4.9E-02 | -- | -- | na | **4.9E-02** |
| DDE [C] | 0 | -- | -- | na | 2.2E-03 | -- | -- | na | 3.5E-01 | -- | -- | na | 2.2E-04 | -- | -- | na | 3.5E-02 | -- | -- | na | **3.5E-02** |
| DDT [C] | 0 | 1.1E+00 | 1.0E-03 | na | 2.2E-03 | 1.3E+00 | 1.8E-02 | na | 3.5E-01 | 2.8E-01 | 2.5E-04 | na | 2.2E-04 | 9.2E+00 | 1.1E-02 | na | 3.5E-02 | **1.3E+00** | **1.1E-02** | na | **3.5E-02** |
| Demeton | 0 | -- | 1.0E-01 | na | -- | -- | 1.8E+00 | na | -- | -- | 2.5E-02 | na | -- | -- | 1.1E+00 | na | -- | -- | **1.1E+00** | na | -- |
| Diazinon | 0 | 1.7E-01 | 1.7E-01 | na | -- | 2.1E-01 | 3.1E+00 | na | -- | 4.3E-02 | 4.3E-02 | na | -- | 1.4E+00 | 1.8E+00 | na | -- | **2.1E-01** | **1.8E+00** | na | -- |
| Dibenz(a,h)anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | **2.8E+00** |
| 1,2-Dichlorobenzene | 0 | -- | -- | na | 1.3E+03 | -- | -- | na | 7.2E+04 | -- | -- | na | 1.3E+02 | -- | -- | na | 7.2E+03 | -- | -- | na | **7.2E+03** |
| 1,3-Dichlorobenzene | 0 | -- | -- | na | 9.6E+02 | -- | -- | na | 5.3E+04 | -- | -- | na | 9.6E+01 | -- | -- | na | 5.3E+03 | -- | -- | na | **5.3E+03** |
| 1,4-Dichlorobenzene | 0 | -- | -- | na | 1.9E+02 | -- | -- | na | 1.1E+04 | -- | -- | na | 1.9E+01 | -- | -- | na | 1.1E+03 | -- | -- | na | **1.1E+03** |
| 3,3-Dichlorobenzidine[C] | 0 | -- | -- | na | 2.8E-01 | -- | -- | na | 4.4E+01 | -- | -- | na | 2.8E-02 | -- | -- | na | 4.4E+00 | -- | -- | na | **4.4E+00** |
| Dichlorobromomethane [C] | 0 | -- | -- | na | 1.7E+02 | -- | -- | na | 2.7E+04 | -- | -- | na | 1.7E+01 | -- | -- | na | 2.7E+03 | -- | -- | na | **2.7E+03** |
| 1,2-Dichloroethane [C] | 0 | -- | -- | na | 3.7E+02 | -- | -- | na | 5.8E+04 | -- | -- | na | 3.7E+01 | -- | -- | na | 5.8E+03 | -- | -- | na | **5.8E+03** |
| 1,1-Dichloroethylene | 0 | -- | -- | na | 7.1E+03 | -- | -- | na | 3.9E+05 | -- | -- | na | 7.1E+02 | -- | -- | na | 3.9E+04 | -- | -- | na | **3.9E+04** |
| 1,2-trans-dichloroethylene | 0 | -- | -- | na | 1.0E+04 | -- | -- | na | 5.5E+05 | -- | -- | na | 1.0E+03 | -- | -- | na | 5.5E+04 | -- | -- | na | **5.5E+04** |
| 2,4-Dichlorophenol | 0 | -- | -- | na | 2.9E+02 | -- | -- | na | 1.6E+04 | -- | -- | na | 2.9E+01 | -- | -- | na | 1.6E+03 | -- | -- | na | **1.6E+03** |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| 1,2-Dichloropropane[C] | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 2.4E+04 | -- | -- | na | 1.5E+01 | -- | -- | na | 2.4E+03 | -- | -- | na | **2.4E+03** |
| 1,3-Dichloropropene [C] | 0 | -- | -- | na | 2.1E+02 | -- | -- | na | 3.3E+04 | -- | -- | na | 2.1E+01 | -- | -- | na | 3.3E+03 | -- | -- | na | **3.3E+03** |
| Dieldrin [C] | 0 | 2.4E-01 | 5.6E-02 | na | 5.4E-04 | 2.9E-01 | 1.0E+00 | na | 8.5E-02 | 6.0E-02 | 1.4E-02 | na | 5.4E-05 | 2.0E+00 | 5.9E-01 | na | 8.5E-03 | **2.9E-01** | **5.9E-01** | na | **8.5E-03** |
| Diethyl Phthalate | 0 | -- | -- | na | 4.4E+04 | -- | -- | na | 2.4E+06 | -- | -- | na | 4.4E+03 | -- | -- | na | 2.4E+05 | -- | -- | na | **2.4E+05** |
| 2,4-Dimethylphenol | 0 | -- | -- | na | 8.5E+02 | -- | -- | na | 4.7E+04 | -- | -- | na | 8.5E+01 | -- | -- | na | 4.7E+03 | -- | -- | na | **4.7E+03** |
| Dimethyl Phthalate | 0 | -- | -- | na | 1.1E+06 | -- | -- | na | 6.1E+07 | -- | -- | na | 1.1E+05 | -- | -- | na | 6.1E+06 | -- | -- | na | **6.1E+06** |
| Di-n-Butyl Phthalate | 0 | -- | -- | na | 4.5E+03 | -- | -- | na | 2.5E+05 | -- | -- | na | 4.5E+02 | -- | -- | na | 2.5E+04 | -- | -- | na | **2.5E+04** |
| 2,4 Dinitrophenol | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 2.9E+05 | -- | -- | na | 5.3E+02 | -- | -- | na | 2.9E+04 | -- | -- | na | **2.9E+04** |
| 2-Methyl-4,6-Dinitrophenol | 0 | -- | -- | na | 2.8E+02 | -- | -- | na | 1.6E+04 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.6E+03 | -- | -- | na | **1.6E+03** |
| 2,4-Dinitrotoluene [C] | 0 | -- | -- | na | 3.4E+01 | -- | -- | na | 5.3E+03 | -- | -- | na | 3.4E+00 | -- | -- | na | 5.3E+02 | -- | -- | na | **5.3E+02** |
| Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin | 0 | -- | -- | na | 5.1E-08 | -- | -- | na | 2.8E-06 | -- | -- | na | 5.1E-09 | -- | -- | na | 2.8E-07 | -- | -- | na | **2.8E-07** |
| 1,2-Diphenylhydrazine[C] | 0 | -- | -- | na | 2.0E+00 | -- | -- | na | 3.1E+02 | -- | -- | na | 2.0E-01 | -- | -- | na | 3.1E+01 | -- | -- | na | **3.1E+01** |
| Alpha-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 2.7E-01 | 1.0E+00 | na | 4.9E+03 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 1.8E+00 | 5.9E-01 | na | 4.9E+02 | **2.7E-01** | **5.9E-01** | na | **4.9E+02** |
| Beta-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 2.7E-01 | 1.0E+00 | na | 4.9E+03 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 1.8E+00 | 5.9E-01 | na | 4.9E+02 | **2.7E-01** | **5.9E-01** | na | **4.9E+02** |
| Alpha + Beta Endosulfan | 0 | 2.2E-01 | 5.6E-02 | -- | -- | 2.7E-01 | 1.0E+00 | -- | -- | 5.5E-02 | 1.4E-02 | -- | -- | 1.8E+00 | 5.9E-01 | -- | -- | **2.7E-01** | **5.9E-01** | -- | -- |
| Endosulfan Sulfate | 0 | -- | -- | na | 8.9E+01 | -- | -- | na | 4.9E+03 | -- | -- | na | 8.9E+00 | -- | -- | na | 4.9E+02 | -- | -- | na | **4.9E+02** |
| Endrin | 0 | 8.6E-02 | 3.6E-02 | na | 6.0E-02 | 1.1E-01 | 6.6E-01 | na | 3.3E+00 | 2.2E-02 | 9.0E-03 | na | 6.0E-03 | 7.2E-01 | 3.8E-01 | na | 3.3E-01 | **1.1E-01** | **3.8E-01** | na | **3.3E-01** |
| Endrin Aldehyde | 0 | -- | -- | na | 3.0E-01 | -- | -- | na | 1.7E+01 | -- | -- | na | 3.0E-02 | -- | -- | na | 1.7E+00 | -- | -- | na | **1.7E+00** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Ethylbenzene | 0 | -- | -- | na | 2.1E+03 | -- | -- | na | 1.2E+05 | -- | -- | na | 2.1E+02 | -- | -- | na | 1.2E+04 | -- | -- | na | **1.2E+04** |
| Fluoranthene | 0 | -- | -- | na | 1.4E+02 | -- | -- | na | 7.8E+03 | -- | -- | na | 1.4E+01 | -- | -- | na | 7.8E+02 | -- | -- | na | **7.8E+02** |
| Fluorene | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 2.9E+05 | -- | -- | na | 5.3E+02 | -- | -- | na | 2.9E+04 | -- | -- | na | **2.9E+04** |
| Foaming Agents | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Guthion | 0 | -- | 1.0E-02 | na | -- | -- | 1.8E-01 | na | -- | -- | 2.5E-03 | na | -- | -- | 1.1E-01 | na | -- | -- | **1.1E-01** | na | -- |
| Heptachlor [C] | 0 | 5.2E-01 | 3.8E-03 | na | 7.9E-04 | 6.4E-01 | 6.9E-02 | na | 1.2E-01 | 1.3E-01 | 9.5E-04 | na | 7.9E-05 | 4.3E+00 | 4.0E-02 | na | 1.2E-02 | **6.4E-01** | **4.0E-02** | na | **1.2E-02** |
| Heptachlor Epoxide[C] | 0 | 5.2E-01 | 3.8E-03 | na | 3.9E-04 | 6.4E-01 | 6.9E-02 | na | 6.1E-02 | 1.3E-01 | 9.5E-04 | na | 3.9E-05 | 4.3E+00 | 4.0E-02 | na | 6.1E-03 | **6.4E-01** | **4.0E-02** | na | **6.1E-03** |
| Hexachlorobenzene[C] | 0 | -- | -- | na | 2.9E-03 | -- | -- | na | 4.6E-01 | -- | -- | na | 2.9E-04 | -- | -- | na | 4.6E-02 | -- | -- | na | **4.6E-02** |
| Hexachlorobutadiene[C] | 0 | -- | -- | na | 1.8E+02 | -- | -- | na | 2.8E+04 | -- | -- | na | 1.8E+01 | -- | -- | na | 2.8E+03 | -- | -- | na | **2.8E+03** |
| Hexachlorocyclohexane Alpha-BHC[C] | 0 | -- | -- | na | 4.9E-02 | -- | -- | na | 7.7E+00 | -- | -- | na | 4.9E-03 | -- | -- | na | 7.7E-01 | -- | -- | na | **7.7E-01** |
| Hexachlorocyclohexane Beta-BHC[C] | 0 | -- | -- | na | 1.7E-01 | -- | -- | na | 2.7E+01 | -- | -- | na | 1.7E-02 | -- | -- | na | 2.7E+00 | -- | -- | na | **2.7E+00** |
| Hexachlorocyclohexane Gamma-BHC[C] (Lindane) | 0 | 9.5E-01 | na | na | 1.8E+00 | 1.2E+00 | -- | na | 2.8E+02 | 2.4E-01 | -- | na | 1.8E-01 | 7.9E+00 | -- | na | 2.8E+01 | **1.2E+00** | -- | na | **2.8E+01** |
| Hexachlorocyclopentadiene | 0 | -- | -- | na | 1.1E+03 | -- | -- | na | 6.1E+04 | -- | -- | na | 1.1E+02 | -- | -- | na | 6.1E+03 | -- | -- | na | **6.1E+03** |
| Hexachloroethane[C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 5.2E+03 | -- | -- | na | 3.3E+00 | -- | -- | na | 5.2E+02 | -- | -- | na | **5.2E+02** |
| Hydrogen Sulfide | 0 | -- | 2.0E+00 | na | -- | -- | 3.7E+01 | na | -- | -- | 5.0E-01 | na | -- | -- | 2.1E+01 | na | -- | -- | **2.1E+01** | na | -- |
| Indeno (1,2,3-cd) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 2.8E+01 | -- | -- | na | 1.8E-02 | -- | -- | na | 2.8E+00 | -- | -- | na | **2.8E+00** |
| Iron | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Isophorone[C] | 0 | -- | -- | na | 9.6E+03 | -- | -- | na | 1.5E+06 | -- | -- | na | 9.6E+02 | -- | -- | na | 1.5E+05 | -- | -- | na | **1.5E+05** |
| Kepone | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | -- |
| Lead | 2.09 | 1.2E+02 | 1.4E+01 | na | -- | 1.4E+02 | 2.2E+02 | na | -- | 3.3E+01 | 5.1E+00 | na | -- | 1.0E+03 | 1.3E+02 | na | -- | **1.4E+02** | **1.3E+02** | na | -- |
| Malathion | 0 | -- | 1.0E-01 | na | -- | -- | 1.8E+00 | na | -- | -- | 2.5E-02 | na | -- | -- | 1.1E+00 | na | -- | -- | **1.1E+00** | na | -- |
| Manganese | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Mercury | | 1.4E+00 | 7.7E-01 | -- | -- | 1.7E+00 | 1.4E+01 | -- | -- | 3.5E-01 | 1.9E-01 | -- | -- | 1.2E+01 | 8.1E+00 | -- | -- | **1.7E+00** | **8.1E+00** | -- | -- |
| Methyl Bromide | 0 | -- | -- | na | 1.5E+03 | -- | -- | na | 8.3E+04 | -- | -- | na | 1.5E+02 | -- | -- | na | 8.3E+03 | -- | -- | na | **8.3E+03** |
| Methylene Chloride [C] | 0 | -- | -- | na | 5.9E+03 | -- | -- | na | 9.3E+05 | -- | -- | na | 5.9E+02 | -- | -- | na | 9.3E+04 | -- | -- | na | **9.3E+04** |
| Methoxychlor | 0 | -- | 3.0E-02 | na | -- | -- | 5.5E-01 | na | -- | -- | 7.5E-03 | na | -- | -- | 3.2E-01 | na | -- | -- | **3.2E-01** | na | -- |
| Mirex | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | -- |
| Nickel | 4.6 | 1.8E+02 | 2.1E+01 | na | 4.6E+03 | 2.2E+02 | 3.0E+02 | na | 2.5E+05 | 5.0E+01 | 8.7E+00 | na | 4.6E+02 | 1.5E+03 | 1.8E+02 | na | 2.5E+04 | **2.2E+02** | **1.8E+02** | na | **2.5E+04** |
| Nitrate (as N) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Nitrobenzene | 0 | -- | -- | na | 6.9E+02 | -- | -- | na | 3.8E+04 | -- | -- | na | 6.9E+01 | -- | -- | na | 3.8E+03 | -- | -- | na | **3.8E+03** |
| N-Nitrosodimethylamine[C] | 0 | -- | -- | na | 3.0E+01 | -- | -- | na | 4.7E+03 | -- | -- | na | 3.0E+00 | -- | -- | na | 4.7E+02 | -- | -- | na | **4.7E+02** |
| N-Nitrosodiphenylamine[C] | 0 | -- | -- | na | 6.0E+01 | -- | -- | na | 9.4E+03 | -- | -- | na | 6.0E+00 | -- | -- | na | 9.4E+02 | -- | -- | na | **9.4E+02** |
| N-Nitrosodi-n-propylamine[C] | 0 | -- | -- | na | 5.1E+00 | -- | -- | na | 8.0E+02 | -- | -- | na | 5.1E-01 | -- | -- | na | 8.0E+01 | -- | -- | na | **8.0E+01** |
| Nonylphenol | 0 | 2.8E+01 | 6.6E+00 | -- | -- | 3.4E+01 | 1.2E+02 | na | -- | 7.0E+00 | 1.7E+00 | -- | -- | 2.3E+02 | 7.0E+01 | -- | -- | **3.4E+01** | **7.0E+01** | na | -- |
| Parathion | 0 | 6.5E-02 | 1.3E-02 | na | -- | 8.0E-02 | 2.4E-01 | na | -- | 1.6E-02 | 3.3E-03 | na | -- | 5.4E-01 | 1.4E-01 | na | -- | **8.0E-02** | **1.4E-01** | na | -- |
| PCB Total[C] | 0 | -- | 1.4E-02 | na | 6.4E-04 | -- | 2.6E-01 | na | 1.0E-01 | -- | 3.5E-03 | na | 6.4E-05 | -- | 1.5E-01 | na | 1.0E-02 | -- | **1.5E-01** | na | **1.0E-02** |
| Pentachlorophenol [C] | 0 | 1.2E+01 | 9.0E+00 | na | 3.0E+01 | 1.4E+01 | 1.7E+02 | na | 4.7E+03 | 2.9E+00 | 2.3E+00 | na | 3.0E+00 | 9.8E+01 | 9.6E+01 | na | 4.7E+02 | **1.4E+01** | **9.6E+01** | na | **4.7E+02** |
| Phenol | 0 | -- | -- | na | 8.6E+05 | -- | -- | na | 4.8E+07 | -- | -- | na | 8.6E+04 | -- | -- | na | 4.8E+06 | -- | -- | na | **4.8E+06** |
| Pyrene | 0 | -- | -- | na | 4.0E+03 | -- | -- | na | 2.2E+05 | -- | -- | na | 4.0E+02 | -- | -- | na | 2.2E+04 | -- | -- | na | **2.2E+04** |
| Radionuclides | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Gross Alpha Activity (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Beta and Photon Activity (mrem/yr) | 0 | -- | -- | na | 4.0E+00 | -- | -- | na | 2.2E+02 | -- | -- | na | 4.0E-01 | -- | -- | na | 2.2E+01 | -- | -- | na | **2.2E+01** |
| Radium 226 + 228 (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Uranium (ug/l) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Selenium, Total Recoverable | 0.835 | 2.0E+01 | 5.0E+00 | na | 4.2E+03 | 2.4E+01 | 7.7E+01 | na | 2.3E+05 | 5.6E+00 | 1.9E+00 | na | 4.2E+02 | 1.6E+02 | 4.5E+01 | na | 2.3E+04 | **2.4E+01** | **4.5E+01** | **na** | **2.3E+04** |
| Silver | 1.057 | 3.3E+00 | -- | na | -- | 3.8E+00 | -- | na | -- | 1.7E+00 | -- | na | -- | 2.3E+01 | -- | na | -- | **3.8E+00** | **--** | **na** | **--** |
| Sulfate | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| 1,1,2,2-Tetrachloroethane[C] | 0 | -- | -- | na | 4.0E+01 | -- | -- | na | 6.3E+03 | -- | -- | na | 4.0E+00 | -- | -- | na | 6.3E+02 | **--** | **--** | **na** | **6.3E+02** |
| Tetrachloroethylene[C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 5.2E+03 | -- | -- | na | 3.3E+00 | -- | -- | na | 5.2E+02 | **--** | **--** | **na** | **5.2E+02** |
| Thallium | 0 | -- | -- | na | 4.7E-01 | -- | -- | na | 2.6E+01 | -- | -- | na | 4.7E-02 | -- | -- | na | 2.6E+00 | **--** | **--** | **na** | **2.6E+00** |
| Toluene | 0 | -- | -- | na | 6.0E+03 | -- | -- | na | 3.3E+05 | -- | -- | na | 6.0E+02 | -- | -- | na | 3.3E+04 | **--** | **--** | **na** | **3.3E+04** |
| Total dissolved solids | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Toxaphene [C] | 0 | 7.3E-01 | 2.0E-04 | na | 2.8E-03 | 9.0E-01 | 3.7E-03 | na | 4.4E-01 | 1.8E-01 | 5.0E-05 | na | 2.8E-04 | 6.1E+00 | 2.1E-03 | na | 4.4E-02 | **9.0E-01** | **2.1E-03** | **na** | **4.4E-02** |
| Tributyltin | 0 | 4.6E-01 | 7.2E-02 | na | -- | 5.6E-01 | 1.3E+00 | na | -- | 1.2E-01 | 1.8E-02 | na | -- | 3.8E+00 | 7.6E-01 | na | -- | **5.6E-01** | **7.6E-01** | **na** | **--** |
| 1,2,4-Trichlorobenzene | 0 | -- | -- | na | 7.0E+01 | -- | -- | na | 3.9E+03 | -- | -- | na | 7.0E+00 | -- | -- | na | 3.9E+02 | **--** | **--** | **na** | **3.9E+02** |
| 1,1,2-Trichloroethane[C] | 0 | -- | -- | na | 1.6E+02 | -- | -- | na | 2.5E+04 | -- | -- | na | 1.6E+01 | -- | -- | na | 2.5E+03 | **--** | **--** | **na** | **2.5E+03** |
| Trichloroethylene [C] | 0 | -- | -- | na | 3.0E+02 | -- | -- | na | 4.7E+04 | -- | -- | na | 3.0E+01 | -- | -- | na | 4.7E+03 | **--** | **--** | **na** | **4.7E+03** |
| 2,4,6-Trichlorophenol [C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 3.8E+03 | -- | -- | na | 2.4E+00 | -- | -- | na | 3.8E+02 | **--** | **--** | **na** | **3.8E+02** |
| 2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Vinyl Chloride[C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 3.8E+03 | -- | -- | na | 2.4E+00 | -- | -- | na | 3.8E+02 | **--** | **--** | **na** | **3.8E+02** |
| Zinc | 18.45 | 1.1E+02 | 1.2E+02 | na | 2.6E+04 | 1.4E+02 | 1.9E+03 | na | 1.4E+06 | 4.4E+01 | 4.4E+01 | na | 2.6E+03 | 8.7E+02 | 1.1E+03 | na | 1.4E+05 | **1.4E+02** | **1.1E+03** | **na** | **1.4E+05** |

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

| Metal | Target Value (SSTV) |
|---|---|
| Antimony | 3.6E+03 |
| Arsenic | 1.7E+02 |
| Barium | na |
| Cadmium | 1.8E+00 |
| Chromium III | 2.7E+02 |
| Chromium VI | 7.8E+00 |
| Copper | 6.2E+00 |
| Iron | na |
| Lead | 5.6E+01 |
| Manganese | na |
| Mercury | 6.9E-01 |
| Nickel | 8.7E+01 |
| Selenium | 9.7E+00 |
| Silver | 1.5E+00 |
| Zinc | 5.5E+01 |

Note: do not use QL's lower than the minimum QL's provided in agency guidance

## 6.150 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD 6.150

| | Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 1.393 | 464.000 | 7.543 | 470.150 |
| 7Q10 | 106.096 | N/A | 112.246 | N/A |
| 30Q10 | 138.823 | 662.000 | 144.973 | 668.150 |
| 30Q5 | 335.000 | N/A | 341.150 | N/A |
| Harm. Mean | 961.000 | N/A | 967.150 | N/A |
| Annual Avg. | 0.000 | N/A | 6.150 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 35.969 | 25.118 |
| 30Q10 90th% Temp. Mix (deg C) | 27.467 | 25.083 |
| 1Q10 90th% pH Mix (SU) | 8.259 | 8.688 |
| 30Q10 90th% pH Mix (SU) | 8.662 | 8.691 |
| 1Q10 10th% pH Mix (SU) | 7.300 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.300 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) | 97.5 | 97.5 |
| 7Q10 Hardness (mg/L as CaCO3) | 103.6 | 103.6 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.259 |
| (7.204 - pH) | -1.055 |
| (pH - 7.204) | 1.055 |
| Trout Present Criterion (mg N/l | 3.413 |
| Trout Absent Criterion (mg N/L | 5.110 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 5.110 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 27.467 |
| 90th Percentile pH (SU) | 8.662 |
| MIN | 1.237 |
| MAX | 27.467 |
| (7.688 - pH) | -0.974 |
| (pH - 7.688) | 0.974 |
| Early LS Present Criterion (mg N | 0.360 |
| Early LS Absent Criterion (mg N/ | 0.360 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.360 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.688 |
| (7.204 - pH) | -1.484 |
| (pH - 7.204) | 1.484 |
| Trout Present Criterion (mg N/l | 1.505 |
| Trout Absent Criterion (mg N/L | 2.254 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.254 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 25.083 |
| 90th Percentile pH (SU) | 8.691 |
| MIN | 1.442 |
| MAX | 25.083 |
| (7.688 - pH) | -1.003 |
| (pH - 7.688) | 1.003 |
| Early LS Present Criterion (mg N | 0.399 |
| Early LS Absent Criterion (mg N/ | 0.399 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.399 |

## 6.150 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD 6.150

| | 100% Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 199.000 | 464.000 | 205.150 | 470.150 |
| 7Q10 | 254.000 | N/A | 260.150 | N/A |
| 30Q10 | 293.000 | 662.000 | 299.150 | 668.150 |
| 30Q5 | 335.000 | N/A | 341.150 | N/A |
| Harm. Mean | 961.000 | N/A | 967.150 | N/A |
| Annual Avg. | 0.000 | N/A | 6.150 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 27.330 | 25.118 |
| 30Q10 90th% Temp. Mix (deg C) | 27.226 | 25.083 |
| 1Q10 90th% pH Mix (SU) | 8.673 | 8.688 |
| 30Q10 90th% pH Mix (SU) | 8.681 | 8.691 |
| 1Q10 10th% pH Mix (SU) | 7.300 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.300 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) = | 103.760 | 103.760 |
| 7Q10 Hardness (mg/L as CaCO3) = | 103.811 | 103.811 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.673 |
| (7.204 - pH) | -1.469 |
| (pH - 7.204) | 1.469 |
| Trout Present Criterion (mg N/l | 1.548 |
| Trout Absent Criterion (mg N/L | 2.317 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.317 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 27.226 |
| 90th Percentile pH (SU) | 8.681 |
| MIN | 1.256 |
| MAX | 27.226 |
| (7.688 - pH) | -0.993 |
| (pH - 7.688) | 0.993 |
| Early LS Present Criterion (mg N | 0.354 |
| Early LS Absent Criterion (mg N/ | 0.354 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.354 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.688 |
| (7.204 - pH) | -1.484 |
| (pH - 7.204) | 1.484 |
| Trout Present Criterion (mg N/l | 1.505 |
| Trout Absent Criterion (mg N/L | 2.254 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.254 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 25.083 |
| 90th Percentile pH (SU) | 8.691 |
| MIN | 1.442 |
| MAX | 25.083 |
| (7.688 - pH) | -1.003 |
| (pH - 7.688) | 1.003 |
| Early LS Present Criterion (mg N | 0.399 |
| Early LS Absent Criterion (mg N/ | 0.399 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.399 |

# Outfall 003

# FRESHWATER
# WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (Outfall 003) with acute ammonia  Permit No.: VA0003026

Receiving Stream: James River  Version: OWP Guidance Memo 00-2011 (8/24/00)

## Stream Information

| | | |
|---|---|---|
| Mean Hardness (as CaCO3) = | 104 | mg/L |
| 90% Temperature (Annual) = | 27 | deg C |
| 90% Temperature (Wet season) = | 25 | deg C |
| 90% Maximum pH = | 8.7 | SU |
| 10% Maximum pH = | 7.3 | SU |
| Tier Designation (1 or 2) = | 2 | |
| Public Water Supply (PWS) Y/N? = | n | |
| Trout Present Y/N? = | n | |
| Early Life Stages Present Y/N? = | y | |

## Stream Flows

| | | |
|---|---|---|
| 1Q10 (Annual) = | 10 | MGD |
| 7Q10 (Annual) = | 20 | MGD |
| 30Q10 (Annual) = | 20 | MGD |
| 1Q10 (Wet season) = | 10 | MGD |
| 30Q10 (Wet season) | 20 | MGD |
| 30Q5 = | 20 | MGD |
| Harmonic Mean = | | MGD |

## Mixing Information

| | |
|---|---|
| Annual - 1Q10 Mix = | 100 % |
| - 7Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |
| Wet Season - 1Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |

## Effluent Information

| | | |
|---|---|---|
| Mean Hardness (as CaCO3) = | 182 | mg/L |
| 90% Temp (Annual) = | 30 | deg C |
| 90% Temp (Wet season) = | 28 | deg C |
| 90% Maximum pH = | 8.2 | SU |
| 10% Maximum pH = | 7.3 | SU |
| Discharge Flow = | 1 | MGD |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Acenapthene | 0 | -- | -- | na | 9.9E+02 | -- | -- | na | 2.1E+04 | -- | -- | na | 9.9E+01 | -- | -- | na | 2.1E+03 | -- | -- | na | **2.1E+03** |
| Acrolein | 0 | -- | -- | na | 9.3E+00 | -- | -- | na | 2.0E+02 | -- | -- | na | 9.3E-01 | -- | -- | na | 2.0E+01 | -- | -- | na | **2.0E+01** |
| Acrylonitrile [C] | 0 | -- | -- | na | 2.5E+00 | -- | -- | na | 2.5E+00 | -- | -- | na | 2.5E-01 | -- | -- | na | 2.5E-01 | -- | -- | na | **2.5E-01** |
| Aldrin [C] | 0 | 3.0E+00 | -- | na | 5.0E-04 | 3.3E+01 | -- | na | 5.0E-04 | 7.5E-01 | -- | na | 5.0E-05 | 8.3E+00 | -- | na | 5.0E-05 | **8.3E+00** | -- | na | **5.0E-05** |
| Ammonia-N (mg/l) (Yearly) | 0.288 | 2.54E+00 | 3.70E-01 | na | -- | 2.5E+01 | 2.0E+00 | na | -- | 8.52E-01 | 3.09E-01 | na | -- | 6.5E+00 | 7.2E-01 | na | -- | **6.5E+00** | **7.2E-01** | na | -- |
| Ammonia-N (mg/l) (High Flow) | 0 | 2.54E+00 | 4.21E-01 | na | -- | 2.8E+01 | 8.8E+00 | na | -- | 6.36E-01 | 1.05E-01 | na | -- | 7.0E+00 | 2.2E+00 | na | -- | **7.0E+00** | **2.2E+00** | na | -- |
| Anthracene | 0 | -- | -- | na | 4.0E+04 | -- | -- | na | 8.4E+05 | -- | -- | na | 4.0E+03 | -- | -- | na | 8.4E+04 | -- | -- | na | **8.4E+04** |
| Antimony | 0 | -- | -- | na | 6.4E+02 | -- | -- | na | 1.3E+04 | -- | -- | na | 6.4E+01 | -- | -- | na | 1.3E+03 | -- | -- | na | **1.3E+03** |
| Arsenic | 0 | 3.4E+02 | 1.5E+02 | na | -- | 3.7E+03 | 3.2E+03 | na | -- | 8.5E+01 | 3.8E+01 | na | -- | 9.4E+02 | 7.9E+02 | na | -- | **9.4E+02** | **7.9E+02** | na | -- |
| Barium | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Benzene [C] | 0 | -- | -- | na | 5.1E+02 | -- | -- | na | 5.1E+02 | -- | -- | na | 5.1E+01 | -- | -- | na | 5.1E+01 | -- | -- | na | **5.1E+01** |
| Benzidine [C] | 0 | -- | -- | na | 2.0E-03 | -- | -- | na | 2.0E-03 | -- | -- | na | 2.0E-04 | -- | -- | na | 2.0E-04 | -- | -- | na | **2.0E-04** |
| Benzo (a) anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Benzo (b) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Benzo (k) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Benzo (a) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Bis2-Chloroethyl Ether [C] | 0 | -- | -- | na | 5.3E+00 | -- | -- | na | 5.3E+00 | -- | -- | na | 5.3E-01 | -- | -- | na | 5.3E-01 | -- | -- | na | **5.3E-01** |
| Bis2-Chloroisopropyl Ether | 0 | -- | -- | na | 6.5E+04 | -- | -- | na | 1.4E+06 | -- | -- | na | 6.5E+03 | -- | -- | na | 1.4E+05 | -- | -- | na | **1.4E+05** |
| Bis 2-Ethylhexyl Phthalate [C] | 0 | -- | -- | na | 2.2E+01 | -- | -- | na | 2.2E+01 | -- | -- | na | 2.2E+00 | -- | -- | na | 2.2E+00 | -- | -- | na | **2.2E+00** |
| Bromoform [C] | 0 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 | -- | -- | na | **1.4E+02** |
| Butylbenzylphthalate | 0 | -- | -- | na | 1.9E+03 | -- | -- | na | 4.0E+04 | -- | -- | na | 1.9E+02 | -- | -- | na | 4.0E+03 | -- | -- | na | **4.0E+03** |
| Cadmium | 0 | 4.4E+00 | 1.2E+00 | na | -- | 4.9E+01 | 2.5E+01 | na | -- | 1.1E+00 | 3.0E-01 | na | -- | 1.2E+01 | 6.3E+00 | na | -- | **1.2E+01** | **6.3E+00** | na | -- |
| Carbon Tetrachloride [C] | 0 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.6E+00 | -- | -- | na | 1.6E+00 | -- | -- | na | **1.6E+00** |
| Chlordane [C] | 0 | 2.4E+00 | 4.3E-03 | na | 8.1E-03 | 2.6E+01 | 9.0E-02 | na | 8.1E-03 | 6.0E-01 | 1.1E-03 | na | 8.1E-04 | 6.6E+00 | 2.3E-02 | na | 8.1E-04 | **6.6E+00** | **2.3E-02** | na | **8.1E-04** |
| Chloride | 0 | 8.6E+05 | 2.3E+05 | na | -- | 9.5E+06 | 4.8E+06 | na | -- | 2.2E+05 | 5.8E+04 | na | -- | 2.4E+06 | 1.2E+06 | na | -- | **2.4E+06** | **1.2E+06** | na | -- |
| TRC | 0 | 1.9E+01 | 1.1E+01 | na | -- | 2.1E+02 | 2.3E+02 | na | -- | 4.8E+00 | 2.8E+00 | na | -- | 5.2E+01 | 5.8E+01 | na | -- | **5.2E+01** | **5.8E+01** | na | -- |
| Chlorobenzene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 3.4E+04 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.4E+03 | -- | -- | na | **3.4E+03** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Chlorodibromomethane[C] | 0 | -- | -- | na | 1.3E+02 | -- | -- | na | 1.3E+02 | -- | -- | na | 1.3E+01 | -- | -- | na | 1.3E+01 | -- | -- | na | **1.3E+01** |
| Chloroform | 0 | -- | -- | na | 1.1E+04 | -- | -- | na | 2.3E+05 | -- | -- | na | 1.1E+03 | -- | -- | na | 2.3E+04 | -- | -- | na | **2.3E+04** |
| 2-Chloronaphthalene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 3.4E+04 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.4E+03 | -- | -- | na | **3.4E+03** |
| 2-Chlorophenol | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.2E+03 | -- | -- | na | 1.5E+01 | -- | -- | na | 3.2E+02 | -- | -- | na | **3.2E+02** |
| Chlorpyrifos | 0 | 8.3E-02 | 4.1E-02 | na | -- | 9.1E-01 | 8.6E-01 | na | -- | 2.1E-02 | 1.0E-02 | na | -- | 2.3E-01 | 2.2E-01 | na | -- | **2.3E-01** | **2.2E-01** | na | -- |
| Chromium III | 0 | 6.2E+02 | 7.9E+01 | na | -- | 6.8E+03 | 1.7E+03 | na | -- | 1.6E+02 | 2.0E+01 | na | -- | 1.7E+03 | 4.1E+02 | na | -- | **1.7E+03** | **4.1E+02** | na | -- |
| Chromium VI | 0 | 1.6E+01 | 1.1E+01 | na | -- | 1.8E+02 | 2.3E+02 | na | -- | 4.0E+00 | 2.8E+00 | na | -- | 4.4E+01 | 5.8E+01 | na | -- | **4.4E+01** | **5.8E+01** | na | -- |
| Chromium, Total | 0 | -- | -- | 1.0E+02 | -- | -- | -- | na | -- | -- | -- | 1.0E+01 | -- | -- | -- | 2.1E+02 | -- | -- | -- | na | -- |
| Chrysene [C] | 0 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-03 | -- | -- | na | 1.8E-03 | -- | -- | na | **1.8E-03** |
| Copper | 0 | 1.5E+01 | 9.5E+00 | na | -- | 1.6E+02 | 2.0E+02 | na | -- | 3.7E+00 | 2.4E+00 | na | -- | 4.1E+01 | 5.0E+01 | na | -- | **4.1E+01** | **5.0E+01** | na | -- |
| Cyanide, Free | 0 | 2.2E+01 | 5.2E+00 | na | 1.6E+04 | 2.4E+02 | 1.1E+02 | na | 3.4E+05 | 5.5E+00 | 1.3E+00 | na | 1.6E+03 | 6.1E+01 | 2.7E+01 | na | 3.4E+04 | **6.1E+01** | **2.7E+01** | na | **3.4E+04** |
| DDD [C] | 0 | -- | -- | na | 3.1E-03 | -- | -- | na | 3.1E-03 | -- | -- | na | 3.1E-04 | -- | -- | na | 3.1E-04 | -- | -- | na | **3.1E-04** |
| DDE [C] | 0 | -- | -- | na | 2.2E-03 | -- | -- | na | 2.2E-03 | -- | -- | na | 2.2E-04 | -- | -- | na | 2.2E-04 | -- | -- | na | **2.2E-04** |
| DDT [C] | 0 | 1.1E+00 | 1.0E-03 | na | 2.2E-03 | 1.2E+01 | 2.1E-02 | na | 2.2E-03 | 2.8E-01 | 2.5E-04 | na | 2.2E-04 | 3.0E+00 | 5.3E-03 | na | 2.2E-04 | **3.0E+00** | **5.3E-03** | na | **2.2E-04** |
| Demeton | 0 | -- | 1.0E-01 | na | -- | -- | 2.1E+00 | na | -- | -- | 2.5E-02 | na | -- | -- | 5.3E-01 | na | -- | -- | **5.3E-01** | na | -- |
| Diazinon | 0 | 1.7E-01 | 1.7E-01 | na | -- | 1.9E+00 | 3.6E+00 | na | -- | 4.3E-02 | 4.3E-02 | na | -- | 4.7E-01 | 8.9E-01 | na | -- | **4.7E-01** | **8.9E-01** | na | -- |
| Dibenz(a,h)anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| 1,2-Dichlorobenzene | 0 | -- | -- | na | 1.3E+03 | -- | -- | na | 2.7E+04 | -- | -- | na | 1.3E+02 | -- | -- | na | 2.7E+03 | -- | -- | na | **2.7E+03** |
| 1,3-Dichlorobenzene | 0 | -- | -- | na | 9.6E+02 | -- | -- | na | 2.0E+04 | -- | -- | na | 9.6E+01 | -- | -- | na | 2.0E+03 | -- | -- | na | **2.0E+03** |
| 1,4-Dichlorobenzene | 0 | -- | -- | na | 1.9E+02 | -- | -- | na | 4.0E+03 | -- | -- | na | 1.9E+01 | -- | -- | na | 4.0E+02 | -- | -- | na | **4.0E+02** |
| 3,3-Dichlorobenzidine[C] | 0 | -- | -- | na | 2.8E-01 | -- | -- | na | 2.8E-01 | -- | -- | na | 2.8E-02 | -- | -- | na | 2.8E-02 | -- | -- | na | **2.8E-02** |
| Dichlorobromomethane [C] | 0 | -- | -- | na | 1.7E+02 | -- | -- | na | 1.7E+02 | -- | -- | na | 1.7E+01 | -- | -- | na | 1.7E+01 | -- | -- | na | **1.7E+01** |
| 1,2-Dichloroethane [C] | 0 | -- | -- | na | 3.7E+02 | -- | -- | na | 3.7E+02 | -- | -- | na | 3.7E+01 | -- | -- | na | 3.7E+01 | -- | -- | na | **3.7E+01** |
| 1,1-Dichloroethylene | 0 | -- | -- | na | 7.1E+03 | -- | -- | na | 1.5E+05 | -- | -- | na | 7.1E+02 | -- | -- | na | 1.5E+04 | -- | -- | na | **1.5E+04** |
| 1,2-trans-dichloroethylene | 0 | -- | -- | na | 1.0E+04 | -- | -- | na | 2.1E+05 | -- | -- | na | 1.0E+03 | -- | -- | na | 2.1E+04 | -- | -- | na | **2.1E+04** |
| 2,4-Dichlorophenol | 0 | -- | -- | na | 2.9E+02 | -- | -- | na | 6.1E+03 | -- | -- | na | 2.9E+01 | -- | -- | na | 6.1E+02 | -- | -- | na | **6.1E+02** |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| 1,2-Dichloropropane[C] | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 1.5E+02 | -- | -- | na | 1.5E+01 | -- | -- | na | 1.5E+01 | -- | -- | na | **1.5E+01** |
| 1,3-Dichloropropene [C] | 0 | -- | -- | na | 2.1E+02 | -- | -- | na | 2.1E+02 | -- | -- | na | 2.1E+01 | -- | -- | na | 2.1E+01 | -- | -- | na | **2.1E+01** |
| Dieldrin [C] | 0 | 2.4E-01 | 5.6E-02 | na | 5.4E-04 | 2.6E+00 | 1.2E+00 | na | 5.4E-04 | 6.0E-02 | 1.4E-02 | na | 5.4E-05 | 6.6E-01 | 2.9E-01 | na | 5.4E-05 | **6.6E-01** | **2.9E-01** | na | **5.4E-05** |
| Diethyl Phthalate | 0 | -- | -- | na | 4.4E+04 | -- | -- | na | 9.2E+05 | -- | -- | na | 4.4E+03 | -- | -- | na | 9.2E+04 | -- | -- | na | **9.2E+04** |
| 2,4-Dimethylphenol | 0 | -- | -- | na | 8.5E+02 | -- | -- | na | 1.8E+04 | -- | -- | na | 8.5E+01 | -- | -- | na | 1.8E+03 | -- | -- | na | **1.8E+03** |
| Dimethyl Phthalate | 0 | -- | -- | na | 1.1E+06 | -- | -- | na | 2.3E+07 | -- | -- | na | 1.1E+05 | -- | -- | na | 2.3E+06 | -- | -- | na | **2.3E+06** |
| Di-n-Butyl Phthalate | 0 | -- | -- | na | 4.5E+03 | -- | -- | na | 9.5E+04 | -- | -- | na | 4.5E+02 | -- | -- | na | 9.5E+03 | -- | -- | na | **9.5E+03** |
| 2,4 Dinitrophenol | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.1E+05 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.1E+04 | -- | -- | na | **1.1E+04** |
| 2-Methyl-4,6-Dinitrophenol | 0 | -- | -- | na | 2.8E+02 | -- | -- | na | 5.9E+03 | -- | -- | na | 2.8E+01 | -- | -- | na | 5.9E+02 | -- | -- | na | **5.9E+02** |
| 2,4-Dinitrotoluene [C] | 0 | -- | -- | na | 3.4E+01 | -- | -- | na | 3.4E+01 | -- | -- | na | 3.4E+00 | -- | -- | na | 3.4E+00 | -- | -- | na | **3.4E+00** |
| Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin | 0 | -- | -- | na | 5.1E-08 | -- | -- | na | 1.1E-06 | -- | -- | na | 5.1E-09 | -- | -- | na | 1.1E-07 | -- | -- | na | **1.1E-07** |
| 1,2-Diphenylhydrazine[C] | 0 | -- | -- | na | 2.0E+00 | -- | -- | na | 2.0E+00 | -- | -- | na | 2.0E-01 | -- | -- | na | 2.0E-01 | -- | -- | na | **2.0E-01** |
| Alpha-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 2.4E+00 | 1.2E+00 | na | 1.9E+03 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 6.1E-01 | 2.9E-01 | na | 1.9E+02 | **6.1E-01** | **2.9E-01** | na | **1.9E+02** |
| Beta-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 2.4E+00 | 1.2E+00 | na | 1.9E+03 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 6.1E-01 | 2.9E-01 | na | 1.9E+02 | **6.1E-01** | **2.9E-01** | na | **1.9E+02** |
| Alpha + Beta Endosulfan | 0 | 2.2E-01 | 5.6E-02 | -- | -- | 2.4E+00 | 1.2E+00 | -- | -- | 5.5E-02 | 1.4E-02 | -- | -- | 6.1E-01 | 2.9E-01 | -- | -- | **6.1E-01** | **2.9E-01** | -- | -- |
| Endosulfan Sulfate | 0 | -- | -- | na | 8.9E+01 | -- | -- | na | 1.9E+03 | -- | -- | na | 8.9E+00 | -- | -- | na | 1.9E+02 | -- | -- | na | **1.9E+02** |
| Endrin | 0 | 8.6E-02 | 3.6E-02 | na | 6.0E-02 | 9.5E-01 | 7.6E-01 | na | 1.3E+00 | 2.2E-02 | 9.0E-03 | na | 6.0E-03 | 2.4E-01 | 1.9E-01 | na | 1.3E-01 | **2.4E-01** | **1.9E-01** | na | **1.3E-01** |
| Endrin Aldehyde | 0 | -- | -- | na | 3.0E-01 | -- | -- | na | 6.3E+00 | -- | -- | na | 3.0E-02 | -- | -- | na | 6.3E-01 | -- | -- | na | **6.3E-01** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Ethylbenzene | 0 | -- | -- | na | 2.1E+03 | -- | -- | na | 4.4E+04 | -- | -- | na | 2.1E+02 | -- | -- | na | 4.4E+03 | -- | -- | na | **4.4E+03** |
| Fluoranthene | 0 | -- | -- | na | 1.4E+02 | -- | -- | na | 2.9E+03 | -- | -- | na | 1.4E+01 | -- | -- | na | 2.9E+02 | -- | -- | na | **2.9E+02** |
| Fluorene | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.1E+05 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.1E+04 | -- | -- | na | **1.1E+04** |
| Foaming Agents | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Guthion | 0 | -- | 1.0E-02 | na | -- | -- | 2.1E-01 | na | -- | -- | 2.5E-03 | na | -- | -- | 5.3E-02 | na | -- | -- | **5.3E-02** | na | **--** |
| Heptachlor [C] | 0 | 5.2E-01 | 3.8E-03 | na | 7.9E-04 | 5.7E+00 | 8.0E-02 | na | 7.9E-04 | 1.3E-01 | 9.5E-04 | na | 7.9E-05 | 1.4E+00 | 2.0E-02 | na | 7.9E-05 | **1.4E+00** | **2.0E-02** | na | **7.9E-05** |
| Heptachlor Epoxide[C] | 0 | 5.2E-01 | 3.8E-03 | na | 3.9E-04 | 5.7E+00 | 8.0E-02 | na | 3.9E-04 | 1.3E-01 | 9.5E-04 | na | 3.9E-05 | 1.4E+00 | 2.0E-02 | na | 3.9E-05 | **1.4E+00** | **2.0E-02** | na | **3.9E-05** |
| Hexachlorobenzene[C] | 0 | -- | -- | na | 2.9E-03 | -- | -- | na | 2.9E-03 | -- | -- | na | 2.9E-04 | -- | -- | na | 2.9E-04 | -- | -- | na | **2.9E-04** |
| Hexachlorobutadiene[C] | 0 | -- | -- | na | 1.8E+02 | -- | -- | na | 1.8E+02 | -- | -- | na | 1.8E+01 | -- | -- | na | 1.8E+01 | -- | -- | na | **1.8E+01** |
| Hexachlorocyclohexane Alpha-BHC[C] | 0 | -- | -- | na | 4.9E-02 | -- | -- | na | 4.9E-02 | -- | -- | na | 4.9E-03 | -- | -- | na | 4.9E-03 | -- | -- | na | **4.9E-03** |
| Hexachlorocyclohexane Beta-BHC[C] | 0 | -- | -- | na | 1.7E-01 | -- | -- | na | 1.7E-01 | -- | -- | na | 1.7E-02 | -- | -- | na | 1.7E-02 | -- | -- | na | **1.7E-02** |
| Hexachlorocyclohexane Gamma-BHC[C] (Lindane) | 0 | 9.5E-01 | na | na | 1.8E+00 | 1.0E+01 | -- | na | 1.8E+00 | 2.4E-01 | -- | na | 1.8E-01 | 2.6E+00 | -- | na | 1.8E-01 | **2.6E+00** | -- | na | **1.8E-01** |
| Hexachlorocyclopentadiene | 0 | -- | -- | na | 1.1E+03 | -- | -- | na | 2.3E+04 | -- | -- | na | 1.1E+02 | -- | -- | na | 2.3E+03 | -- | -- | na | **2.3E+03** |
| Hexachloroethane[C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+00 | -- | -- | na | 3.3E+00 | -- | -- | na | **3.3E+00** |
| Hydrogen Sulfide | 0 | -- | 2.0E+00 | na | -- | -- | 4.2E+01 | na | -- | -- | 5.0E-01 | na | -- | -- | 1.1E+01 | na | -- | -- | **1.1E+01** | na | **--** |
| Indeno (1,2,3-cd) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Iron | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Isophorone[C] | 0 | -- | -- | na | 9.6E+03 | -- | -- | na | 9.6E+03 | -- | -- | na | 9.6E+02 | -- | -- | na | 9.6E+02 | -- | -- | na | **9.6E+02** |
| Kepone | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | **--** |
| Lead | 0 | 1.4E+02 | 1.5E+01 | na | -- | 1.5E+03 | 3.1E+02 | na | -- | 3.4E+01 | 3.7E+00 | na | -- | 3.7E+02 | 7.8E+01 | na | -- | **3.7E+02** | **7.8E+01** | na | **--** |
| Malathion | 0 | -- | 1.0E-01 | na | -- | -- | 2.1E+00 | na | -- | -- | 2.5E-02 | na | -- | -- | 5.3E-01 | na | -- | -- | **5.3E-01** | na | **--** |
| Manganese | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Mercury | | 1.4E+00 | 7.7E-01 | -- | -- | 1.5E+01 | 1.6E+01 | -- | -- | 3.5E-01 | 1.9E-01 | -- | -- | 3.9E+00 | 4.0E+00 | -- | -- | **3.9E+00** | **4.0E+00** | -- | **--** |
| Methyl Bromide | 0 | -- | -- | na | 1.5E+03 | -- | -- | na | 3.2E+04 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.2E+03 | -- | -- | na | **3.2E+03** |
| Methylene Chloride [C] | 0 | -- | -- | na | 5.9E+03 | -- | -- | na | 5.9E+03 | -- | -- | na | 5.9E+02 | -- | -- | na | 5.9E+02 | -- | -- | na | **5.9E+02** |
| Methoxychlor | 0 | -- | 3.0E-02 | na | -- | -- | 6.3E-01 | na | -- | -- | 7.5E-03 | na | -- | -- | 1.6E-01 | na | -- | -- | **1.6E-01** | na | **--** |
| Mirex | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | **--** |
| Nickel | 0 | 2.0E+02 | 2.2E+01 | na | 4.6E+03 | 2.2E+03 | 4.5E+02 | na | 9.7E+04 | 5.0E+01 | 5.4E+00 | na | 4.6E+02 | 5.5E+02 | 1.1E+02 | na | 9.7E+03 | **5.5E+02** | **1.1E+02** | na | **9.7E+03** |
| Nitrate (as N) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Nitrobenzene | 0 | -- | -- | na | 6.9E+02 | -- | -- | na | 1.4E+04 | -- | -- | na | 6.9E+01 | -- | -- | na | 1.4E+03 | -- | -- | na | **1.4E+03** |
| N-Nitrosodimethylamine[C] | 0 | -- | -- | na | 3.0E+01 | -- | -- | na | 3.0E+01 | -- | -- | na | 3.0E+00 | -- | -- | na | 3.0E+00 | -- | -- | na | **3.0E+00** |
| N-Nitrosodiphenylamine[C] | 0 | -- | -- | na | 6.0E+01 | -- | -- | na | 6.0E+01 | -- | -- | na | 6.0E+00 | -- | -- | na | 6.0E+00 | -- | -- | na | **6.0E+00** |
| N-Nitrosodi-n-propylamine[C] | 0 | -- | -- | na | 5.1E+00 | -- | -- | na | 5.1E+00 | -- | -- | na | 5.1E-01 | -- | -- | na | 5.1E-01 | -- | -- | na | **5.1E-01** |
| Nonylphenol | 0 | 2.8E+01 | 6.6E+00 | -- | -- | 3.1E+02 | 1.4E+02 | na | -- | 7.0E+00 | 1.7E+00 | -- | -- | 7.7E+01 | 3.5E+01 | -- | -- | **7.7E+01** | **3.5E+01** | na | **--** |
| Parathion | 0 | 6.5E-02 | 1.3E-02 | na | -- | 7.2E-01 | 2.7E-01 | na | -- | 1.6E-02 | 3.3E-03 | na | -- | 1.8E-01 | 6.8E-02 | na | -- | **1.8E-01** | **6.8E-02** | na | **--** |
| PCB Total[C] | 0 | -- | 1.4E-02 | na | 6.4E-04 | -- | 2.9E-01 | na | 6.4E-04 | -- | 3.5E-03 | na | 6.4E-05 | -- | 7.4E-02 | na | 6.4E-05 | -- | **7.4E-02** | na | **6.4E-05** |
| Pentachlorophenol [C] | 0 | 1.2E+01 | 9.0E+00 | na | 3.0E+01 | 1.3E+02 | 1.9E+02 | na | 3.0E+01 | 2.9E+00 | 2.3E+00 | na | 3.0E+00 | 3.2E+01 | 4.7E+01 | na | 3.0E+00 | **3.2E+01** | **4.7E+01** | na | **3.0E+00** |
| Phenol | 0 | -- | -- | na | 8.6E+05 | -- | -- | na | 1.8E+07 | -- | -- | na | 8.6E+04 | -- | -- | na | 1.8E+06 | -- | -- | na | **1.8E+06** |
| Pyrene | 0 | -- | -- | na | 4.0E+03 | -- | -- | na | 8.4E+04 | -- | -- | na | 4.0E+02 | -- | -- | na | 8.4E+03 | -- | -- | na | **8.4E+03** |
| Radionuclides | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Gross Alpha Activity (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Beta and Photon Activity (mrem/yr) | 0 | -- | -- | na | 4.0E+00 | -- | -- | na | 8.4E+01 | -- | -- | na | 4.0E-01 | -- | -- | na | 8.4E+00 | -- | -- | na | **8.4E+00** |
| Radium 226 + 228 (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Uranium (ug/l) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Selenium, Total Recoverable | 0 | 2.0E+01 | 5.0E+00 | na | 4.2E+03 | 2.2E+02 | 1.1E+02 | na | 8.8E+04 | 5.0E+00 | 1.3E+00 | na | 4.2E+02 | 5.5E+01 | 2.6E+01 | na | 8.8E+03 | **5.5E+01** | **2.6E+01** | **na** | **8.8E+03** |
| Silver | 0 | 4.1E+00 | -- | na | -- | 4.5E+01 | -- | na | -- | 1.0E+00 | -- | na | -- | 1.1E+01 | -- | na | -- | **1.1E+01** | **--** | **na** | **--** |
| Sulfate | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| 1,1,2,2-Tetrachloroethane[C] | 0 | -- | -- | na | 4.0E+01 | -- | -- | na | 4.0E+01 | -- | -- | na | 4.0E+00 | -- | -- | na | 4.0E+00 | **--** | **--** | **na** | **4.0E+00** |
| Tetrachloroethylene[C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+00 | -- | -- | na | 3.3E+00 | **--** | **--** | **na** | **3.3E+00** |
| Thallium | 0 | -- | -- | na | 4.7E-01 | -- | -- | na | 9.9E+00 | -- | -- | na | 4.7E-02 | -- | -- | na | 9.9E-01 | **--** | **--** | **na** | **9.9E-01** |
| Toluene | 0 | -- | -- | na | 6.0E+03 | -- | -- | na | 1.3E+05 | -- | -- | na | 6.0E+02 | -- | -- | na | 1.3E+04 | **--** | **--** | **na** | **1.3E+04** |
| Total dissolved solids | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Toxaphene [C] | 0 | 7.3E-01 | 2.0E-04 | na | 2.8E-03 | 8.0E+00 | 4.2E-03 | na | 2.8E-03 | 1.8E-01 | 5.0E-05 | na | 2.8E-04 | 2.0E+00 | 1.1E-03 | na | 2.8E-04 | **2.0E+00** | **1.1E-03** | **na** | **2.8E-04** |
| Tributyltin | 0 | 4.6E-01 | 7.2E-02 | na | -- | 5.1E+00 | 1.5E+00 | na | -- | 1.2E-01 | 1.8E-02 | na | -- | 1.3E+00 | 3.8E-01 | na | -- | **1.3E+00** | **3.8E-01** | **na** | **--** |
| 1,2,4-Trichlorobenzene | 0 | -- | -- | na | 7.0E+01 | -- | -- | na | 1.5E+03 | -- | -- | na | 7.0E+00 | -- | -- | na | 1.5E+02 | **--** | **--** | **na** | **1.5E+02** |
| 1,1,2-Trichloroethane[C] | 0 | -- | -- | na | 1.6E+02 | -- | -- | na | 1.6E+02 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.6E+01 | **--** | **--** | **na** | **1.6E+01** |
| Trichloroethylene [C] | 0 | -- | -- | na | 3.0E+02 | -- | -- | na | 3.0E+02 | -- | -- | na | 3.0E+01 | -- | -- | na | 3.0E+01 | **--** | **--** | **na** | **3.0E+01** |
| 2,4,6-Trichlorophenol [C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+00 | -- | -- | na | 2.4E+00 | **--** | **--** | **na** | **2.4E+00** |
| 2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Vinyl Chloride[C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+00 | -- | -- | na | 2.4E+00 | **--** | **--** | **na** | **2.4E+00** |
| Zinc | 0 | 1.3E+02 | 1.3E+02 | na | 2.6E+04 | 1.4E+03 | 2.6E+03 | na | 5.5E+05 | 3.2E+01 | 3.1E+01 | na | 2.6E+03 | 3.5E+02 | 6.6E+02 | na | 5.5E+04 | **3.5E+02** | **6.6E+02** | **na** | **5.5E+04** |

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

| Metal | Target Value (SSTV) |
|---|---|
| Antimony | 1.3E+03 |
| Arsenic | 3.7E+02 |
| Barium | na |
| Cadmium | 3.8E+00 |
| Chromium III | 2.5E+02 |
| Chromium VI | 1.8E+01 |
| Copper | 1.6E+01 |
| Iron | na |
| Lead | 4.7E+01 |
| Manganese | na |
| Mercury | 1.5E+00 |
| Nickel | 6.8E+01 |
| Selenium | 1.6E+01 |
| Silver | 4.5E+00 |
| Zinc | 1.4E+02 |

Note: do not use QL's lower than the minimum QL's provided in agency guidance

## 1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

| | Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 10.000 | 10.000 | 11.000 | 11.000 |
| 7Q10 | 20.000 | N/A | 21.000 | N/A |
| 30Q10 | 20.000 | 20.000 | 21.000 | 21.000 |
| 30Q5 | 20.000 | N/A | 21.000 | N/A |
| Harm. Mean | 0.000 | N/A | 1.000 | N/A |
| Annual Avg. | 0.000 | N/A | 1.000 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 27.273 | 25.273 |
| 30Q10 90th% Temp. Mix (deg C) | 27.143 | 25.143 |
| 1Q10 90th% pH Mix (SU) | 8.622 | 8.622 |
| 30Q10 90th% pH Mix (SU) | 8.657 | 8.657 |
| 1Q10 10th% pH Mix (SU) | 7.300 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.300 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) | 111.1 | 111.1 |
| 7Q10 Hardness (mg/L as CaCO3) | 107.7 | 107.7 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 27.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.263 |
| MAX | 27.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.370 |
| Early LS Absent Criterion (mg N/ | 0.370 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.370 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 25.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.437 |
| MAX | 25.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.421 |
| Early LS Absent Criterion (mg N/ | 0.421 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.421 |

## 1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

| | 100% Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 10.000 | 10.000 | 11.000 | 11.000 |
| 7Q10 | 20.000 | N/A | 21.000 | N/A |
| 30Q10 | 20.000 | 20.000 | 21.000 | 21.000 |
| 30Q5 | 20.000 | N/A | 21.000 | N/A |
| Harm. Mean | 0.000 | N/A | 1.000 | N/A |
| Annual Avg. | 0.000 | N/A | 1.000 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 27.273 | 25.273 |
| 30Q10 90th% Temp. Mix (deg C) | 27.143 | 25.143 |
| 1Q10 90th% pH Mix (SU) | 8.622 | 8.622 |
| 30Q10 90th% pH Mix (SU) | 8.657 | 8.657 |
| 1Q10 10th% pH Mix (SU) | 7.300 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.300 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) = | 111.091 | 111.091 |
| 7Q10 Hardness (mg/L as CaCO3) = | 107.714 | 107.714 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 27.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.263 |
| MAX | 27.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.370 |
| Early LS Absent Criterion (mg N/ | 0.370 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.370 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 25.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.437 |
| MAX | 25.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.421 |
| Early LS Absent Criterion (mg N/ | 0.421 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.421 |

# FRESHWATER
# WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (Outfall 003) with chronic ammonia  Permit No.: VA0003026

Receiving Stream: James River  Version: OWP Guidance Memo 00-2011 (8/24/00)

**Stream Information**

| | |
|---|---|
| Mean Hardness (as CaCO3) = | 104 mg/L |
| 90% Temperature (Annual) = | 27 deg C |
| 90% Temperature (Wet season) = | 25 deg C |
| 90% Maximum pH = | 8.7 SU |
| 10% Maximum pH = | 7.3 SU |
| Tier Designation (1 or 2) = | 2 |
| Public Water Supply (PWS) Y/N? = | n |
| Trout Present Y/N? = | n |
| Early Life Stages Present Y/N? = | y |

**Stream Flows**

| | |
|---|---|
| 1Q10 (Annual) = | 10 MGD |
| 7Q10 (Annual) = | 20 MGD |
| 30Q10 (Annual) = | 20 MGD |
| 1Q10 (Wet season) = | 10 MGD |
| 30Q10 (Wet season) | 20 MGD |
| 30Q5 = | 20 MGD |
| Harmonic Mean = | MGD |

**Mixing Information**

| | |
|---|---|
| Annual - 1Q10 Mix = | 100 % |
| - 7Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |
| Wet Season - 1Q10 Mix = | 100 % |
| - 30Q10 Mix = | 100 % |

**Effluent Information**

| | |
|---|---|
| Mean Hardness (as CaCO3) = | 182 mg/L |
| 90% Temp (Annual) = | 30 deg C |
| 90% Temp (Wet season) = | 28 deg C |
| 90% Maximum pH = | 8.2 SU |
| 10% Maximum pH = | 7.3 SU |
| Discharge Flow = | 1 MGD |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Acenapthene | 0 | -- | -- | na | 9.9E+02 | -- | -- | na | 2.1E+04 | -- | -- | na | 9.9E+01 | -- | -- | na | 2.1E+03 | -- | -- | na | **2.1E+03** |
| Acrolein | 0 | -- | -- | na | 9.3E+00 | -- | -- | na | 2.0E+02 | -- | -- | na | 9.3E-01 | -- | -- | na | 2.0E+01 | -- | -- | na | **2.0E+01** |
| Acrylonitrile [C] | 0 | -- | -- | na | 2.5E+00 | -- | -- | na | 2.5E+00 | -- | -- | na | 2.5E-01 | -- | -- | na | 2.5E-01 | -- | -- | na | **2.5E-01** |
| Aldrin [C] | 0 | 3.0E+00 | -- | na | 5.0E-04 | 3.3E+01 | -- | na | 5.0E-04 | 7.5E-01 | -- | na | 5.0E-05 | 8.3E+00 | -- | na | 5.0E-05 | **8.3E+00** | -- | na | **5.0E-05** |
| Ammonia-N (mg/l) (Yearly) | 0.055 | 2.54E+00 | 3.70E-01 | na | -- | 2.7E+01 | 6.7E+00 | na | -- | 6.77E-01 | 1.34E-01 | na | -- | 6.9E+00 | 1.7E+00 | na | -- | **6.9E+00** | **1.7E+00** | na | -- |
| Ammonia-N (mg/l) (High Flow) | 0 | 2.54E+00 | 4.21E-01 | na | -- | 2.8E+01 | 8.8E+00 | na | -- | 6.36E-01 | 1.05E-01 | na | -- | 7.0E+00 | 2.2E+00 | na | -- | **7.0E+00** | **2.2E+00** | na | -- |
| Anthracene | 0 | -- | -- | na | 4.0E+04 | -- | -- | na | 8.4E+05 | -- | -- | na | 4.0E+03 | -- | -- | na | 8.4E+04 | -- | -- | na | **8.4E+04** |
| Antimony | 0 | -- | -- | na | 6.4E+02 | -- | -- | na | 1.3E+04 | -- | -- | na | 6.4E+01 | -- | -- | na | 1.3E+03 | -- | -- | na | **1.3E+03** |
| Arsenic | 0 | 3.4E+02 | 1.5E+02 | na | -- | 3.7E+03 | 3.2E+03 | na | -- | 8.5E+01 | 3.8E+01 | na | -- | 9.4E+02 | 7.9E+02 | na | -- | **9.4E+02** | **7.9E+02** | na | -- |
| Barium | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| Benzene [C] | 0 | -- | -- | na | 5.1E+02 | -- | -- | na | 5.1E+02 | -- | -- | na | 5.1E+01 | -- | -- | na | 5.1E+01 | -- | -- | na | **5.1E+01** |
| Benzidine [C] | 0 | -- | -- | na | 2.0E-03 | -- | -- | na | 2.0E-03 | -- | -- | na | 2.0E-04 | -- | -- | na | 2.0E-04 | -- | -- | na | **2.0E-04** |
| Benzo (a) anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Benzo (b) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Benzo (k) fluoranthene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Benzo (a) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Bis2-Chloroethyl Ether [C] | 0 | -- | -- | na | 5.3E+00 | -- | -- | na | 5.3E+00 | -- | -- | na | 5.3E-01 | -- | -- | na | 5.3E-01 | -- | -- | na | **5.3E-01** |
| Bis2-Chloroisopropyl Ether | 0 | -- | -- | na | 6.5E+04 | -- | -- | na | 1.4E+06 | -- | -- | na | 6.5E+03 | -- | -- | na | 1.4E+05 | -- | -- | na | **1.4E+05** |
| Bis 2-Ethylhexyl Phthalate [C] | 0 | -- | -- | na | 2.2E+01 | -- | -- | na | 2.2E+01 | -- | -- | na | 2.2E+00 | -- | -- | na | 2.2E+00 | -- | -- | na | **2.2E+00** |
| Bromoform [C] | 0 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.4E+03 | -- | -- | na | 1.4E+02 | -- | -- | na | 1.4E+02 | -- | -- | na | **1.4E+02** |
| Butylbenzylphthalate | 0 | -- | -- | na | 1.9E+03 | -- | -- | na | 4.0E+04 | -- | -- | na | 1.9E+02 | -- | -- | na | 4.0E+03 | -- | -- | na | **4.0E+03** |
| Cadmium | 0 | 4.4E+00 | 1.2E+00 | na | -- | 4.9E+01 | 2.5E+01 | na | -- | 1.1E+00 | 3.0E-01 | na | -- | 1.2E+01 | 6.3E+00 | na | -- | **1.2E+01** | **6.3E+00** | na | -- |
| Carbon Tetrachloride [C] | 0 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.6E+00 | -- | -- | na | 1.6E+00 | -- | -- | na | **1.6E+00** |
| Chlordane [C] | 0 | 2.4E+00 | 4.3E-03 | na | 8.1E-03 | 2.6E+01 | 9.0E-02 | na | 8.1E-03 | 6.0E-01 | 1.1E-03 | na | 8.1E-04 | 6.6E+00 | 2.3E-02 | na | 8.1E-04 | **6.6E+00** | **2.3E-02** | na | **8.1E-04** |
| Chloride | 0 | 8.6E+05 | 2.3E+05 | na | -- | 9.5E+06 | 4.8E+06 | na | -- | 2.2E+05 | 5.8E+04 | na | -- | 2.4E+06 | 1.2E+06 | na | -- | **2.4E+06** | **1.2E+06** | na | -- |
| TRC | 0 | 1.9E+01 | 1.1E+01 | na | -- | 2.1E+02 | 2.3E+02 | na | -- | 4.8E+00 | 2.8E+00 | na | -- | 5.2E+01 | 5.8E+01 | na | -- | **5.2E+01** | **5.8E+01** | na | -- |
| Chlorobenzene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 3.4E+04 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.4E+03 | -- | -- | na | **3.4E+03** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Chlorodibromomethane[C] | 0 | -- | -- | na | 1.3E+02 | -- | -- | na | 1.3E+02 | -- | -- | na | 1.3E+01 | -- | -- | na | 1.3E+01 | -- | -- | na | **1.3E+01** |
| Chloroform | 0 | -- | -- | na | 1.1E+04 | -- | -- | na | 2.3E+05 | -- | -- | na | 1.1E+03 | -- | -- | na | 2.3E+04 | -- | -- | na | **2.3E+04** |
| 2-Chloronaphthalene | 0 | -- | -- | na | 1.6E+03 | -- | -- | na | 3.4E+04 | -- | -- | na | 1.6E+02 | -- | -- | na | 3.4E+03 | -- | -- | na | **3.4E+03** |
| 2-Chlorophenol | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.2E+03 | -- | -- | na | 1.5E+01 | -- | -- | na | 3.2E+02 | -- | -- | na | **3.2E+02** |
| Chlorpyrifos | 0 | 8.3E-02 | 4.1E-02 | na | -- | 9.1E-01 | 8.6E-01 | na | -- | 2.1E-02 | 1.0E-02 | na | -- | 2.3E-01 | 2.2E-01 | na | -- | **2.3E-01** | **2.2E-01** | na | -- |
| Chromium III | 0 | 6.2E+02 | 7.9E+01 | na | -- | 6.8E+03 | 1.7E+03 | na | -- | 1.6E+02 | 2.0E+01 | na | -- | 1.7E+03 | 4.1E+02 | na | -- | **1.7E+03** | **4.1E+02** | na | -- |
| Chromium VI | 0 | 1.6E+01 | 1.1E+01 | na | -- | 1.8E+02 | 2.3E+02 | na | -- | 4.0E+00 | 2.8E+00 | na | -- | 4.4E+01 | 5.8E+01 | na | -- | **4.4E+01** | **5.8E+01** | na | -- |
| Chromium, Total | 0 | -- | -- | 1.0E+02 | -- | -- | -- | na | -- | -- | -- | 1.0E+01 | -- | -- | -- | 2.1E+02 | -- | -- | -- | na | -- |
| Chrysene [C] | 0 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-03 | -- | -- | na | 1.8E-03 | -- | -- | na | **1.8E-03** |
| Copper | 0 | 1.5E+01 | 9.5E+00 | na | -- | 1.6E+02 | 2.0E+02 | na | -- | 3.7E+00 | 2.4E+00 | na | -- | 4.1E+01 | 5.0E+01 | na | -- | **4.1E+01** | **5.0E+01** | na | -- |
| Cyanide, Free | 0 | 2.2E+01 | 5.2E+00 | na | 1.6E+04 | 2.4E+02 | 1.1E+02 | na | 3.4E+05 | 5.5E+00 | 1.3E+00 | na | 1.6E+03 | 6.1E+01 | 2.7E+01 | na | 3.4E+04 | **6.1E+01** | **2.7E+01** | na | **3.4E+04** |
| DDD [C] | 0 | -- | -- | na | 3.1E-03 | -- | -- | na | 3.1E-03 | -- | -- | na | 3.1E-04 | -- | -- | na | 3.1E-04 | -- | -- | na | **3.1E-04** |
| DDE [C] | 0 | -- | -- | na | 2.2E-03 | -- | -- | na | 2.2E-03 | -- | -- | na | 2.2E-04 | -- | -- | na | 2.2E-04 | -- | -- | na | **2.2E-04** |
| DDT [C] | 0 | 1.1E+00 | 1.0E-03 | na | 2.2E-03 | 1.2E+01 | 2.1E-02 | na | 2.2E-03 | 2.8E-01 | 2.5E-04 | na | 2.2E-04 | 3.0E+00 | 5.3E-03 | na | 2.2E-04 | **3.0E+00** | **5.3E-03** | na | **2.2E-04** |
| Demeton | 0 | -- | 1.0E-01 | na | -- | -- | 2.1E+00 | na | -- | -- | 2.5E-02 | na | -- | -- | 5.3E-01 | na | -- | -- | **5.3E-01** | na | -- |
| Diazinon | 0 | 1.7E-01 | 1.7E-01 | na | -- | 1.9E+00 | 3.6E+00 | na | -- | 4.3E-02 | 4.3E-02 | na | -- | 4.7E-01 | 8.9E-01 | na | -- | **4.7E-01** | **8.9E-01** | na | -- |
| Dibenz(a,h)anthracene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| 1,2-Dichlorobenzene | 0 | -- | -- | na | 1.3E+03 | -- | -- | na | 2.7E+04 | -- | -- | na | 1.3E+02 | -- | -- | na | 2.7E+03 | -- | -- | na | **2.7E+03** |
| 1,3-Dichlorobenzene | 0 | -- | -- | na | 9.6E+02 | -- | -- | na | 2.0E+04 | -- | -- | na | 9.6E+01 | -- | -- | na | 2.0E+03 | -- | -- | na | **2.0E+03** |
| 1,4-Dichlorobenzene | 0 | -- | -- | na | 1.9E+02 | -- | -- | na | 4.0E+03 | -- | -- | na | 1.9E+01 | -- | -- | na | 4.0E+02 | -- | -- | na | **4.0E+02** |
| 3,3-Dichlorobenzidine[C] | 0 | -- | -- | na | 2.8E-01 | -- | -- | na | 2.8E-01 | -- | -- | na | 2.8E-02 | -- | -- | na | 2.8E-02 | -- | -- | na | **2.8E-02** |
| Dichlorobromomethane [C] | 0 | -- | -- | na | 1.7E+02 | -- | -- | na | 1.7E+02 | -- | -- | na | 1.7E+01 | -- | -- | na | 1.7E+01 | -- | -- | na | **1.7E+01** |
| 1,2-Dichloroethane [C] | 0 | -- | -- | na | 3.7E+02 | -- | -- | na | 3.7E+02 | -- | -- | na | 3.7E+01 | -- | -- | na | 3.7E+01 | -- | -- | na | **3.7E+01** |
| 1,1-Dichloroethylene | 0 | -- | -- | na | 7.1E+03 | -- | -- | na | 1.5E+05 | -- | -- | na | 7.1E+02 | -- | -- | na | 1.5E+04 | -- | -- | na | **1.5E+04** |
| 1,2-trans-dichloroethylene | 0 | -- | -- | na | 1.0E+04 | -- | -- | na | 2.1E+05 | -- | -- | na | 1.0E+03 | -- | -- | na | 2.1E+04 | -- | -- | na | **2.1E+04** |
| 2,4-Dichlorophenol | 0 | -- | -- | na | 2.9E+02 | -- | -- | na | 6.1E+03 | -- | -- | na | 2.9E+01 | -- | -- | na | 6.1E+02 | -- | -- | na | **6.1E+02** |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- |
| 1,2-Dichloropropane[C] | 0 | -- | -- | na | 1.5E+02 | -- | -- | na | 1.5E+02 | -- | -- | na | 1.5E+01 | -- | -- | na | 1.5E+01 | -- | -- | na | **1.5E+01** |
| 1,3-Dichloropropene [C] | 0 | -- | -- | na | 2.1E+02 | -- | -- | na | 2.1E+02 | -- | -- | na | 2.1E+01 | -- | -- | na | 2.1E+01 | -- | -- | na | **2.1E+01** |
| Dieldrin [C] | 0 | 2.4E-01 | 5.6E-02 | na | 5.4E-04 | 2.6E+00 | 1.2E+00 | na | 5.4E-04 | 6.0E-02 | 1.4E-02 | na | 5.4E-05 | 6.6E-01 | 2.9E-01 | na | 5.4E-05 | **6.6E-01** | **2.9E-01** | na | **5.4E-05** |
| Diethyl Phthalate | 0 | -- | -- | na | 4.4E+04 | -- | -- | na | 9.2E+05 | -- | -- | na | 4.4E+03 | -- | -- | na | 9.2E+04 | -- | -- | na | **9.2E+04** |
| 2,4-Dimethylphenol | 0 | -- | -- | na | 8.5E+02 | -- | -- | na | 1.8E+04 | -- | -- | na | 8.5E+01 | -- | -- | na | 1.8E+03 | -- | -- | na | **1.8E+03** |
| Dimethyl Phthalate | 0 | -- | -- | na | 1.1E+06 | -- | -- | na | 2.3E+07 | -- | -- | na | 1.1E+05 | -- | -- | na | 2.3E+06 | -- | -- | na | **2.3E+06** |
| Di-n-Butyl Phthalate | 0 | -- | -- | na | 4.5E+03 | -- | -- | na | 9.5E+04 | -- | -- | na | 4.5E+02 | -- | -- | na | 9.5E+03 | -- | -- | na | **9.5E+03** |
| 2,4 Dinitrophenol | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.1E+05 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.1E+04 | -- | -- | na | **1.1E+04** |
| 2-Methyl-4,6-Dinitrophenol | 0 | -- | -- | na | 2.8E+02 | -- | -- | na | 5.9E+03 | -- | -- | na | 2.8E+01 | -- | -- | na | 5.9E+02 | -- | -- | na | **5.9E+02** |
| 2,4-Dinitrotoluene [C] | 0 | -- | -- | na | 3.4E+01 | -- | -- | na | 3.4E+01 | -- | -- | na | 3.4E+00 | -- | -- | na | 3.4E+00 | -- | -- | na | **3.4E+00** |
| Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin | 0 | -- | -- | na | 5.1E-08 | -- | -- | na | 1.1E-06 | -- | -- | na | 5.1E-09 | -- | -- | na | 1.1E-07 | -- | -- | na | **1.1E-07** |
| 1,2-Diphenylhydrazine[C] | 0 | -- | -- | na | 2.0E+00 | -- | -- | na | 2.0E+00 | -- | -- | na | 2.0E-01 | -- | -- | na | 2.0E-01 | -- | -- | na | **2.0E-01** |
| Alpha-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 2.4E+00 | 1.2E+00 | na | 1.9E+03 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 6.1E-01 | 2.9E-01 | na | 1.9E+02 | **6.1E-01** | **2.9E-01** | na | **1.9E+02** |
| Beta-Endosulfan | 0 | 2.2E-01 | 5.6E-02 | na | 8.9E+01 | 2.4E+00 | 1.2E+00 | na | 1.9E+03 | 5.5E-02 | 1.4E-02 | na | 8.9E+00 | 6.1E-01 | 2.9E-01 | na | 1.9E+02 | **6.1E-01** | **2.9E-01** | na | **1.9E+02** |
| Alpha + Beta Endosulfan | 0 | 2.2E-01 | 5.6E-02 | -- | -- | 2.4E+00 | 1.2E+00 | -- | -- | 5.5E-02 | 1.4E-02 | -- | -- | 6.1E-01 | 2.9E-01 | -- | -- | **6.1E-01** | **2.9E-01** | -- | -- |
| Endosulfan Sulfate | 0 | -- | -- | na | 8.9E+01 | -- | -- | na | 1.9E+03 | -- | -- | na | 8.9E+00 | -- | -- | na | 1.9E+02 | -- | -- | na | **1.9E+02** |
| Endrin | 0 | 8.6E-02 | 3.6E-02 | na | 6.0E-02 | 9.5E-01 | 7.6E-01 | na | 1.3E+00 | 2.2E-02 | 9.0E-03 | na | 6.0E-03 | 2.4E-01 | 1.9E-01 | na | 1.3E-01 | **2.4E-01** | **1.9E-01** | na | **1.3E-01** |
| Endrin Aldehyde | 0 | -- | -- | na | 3.0E-01 | -- | -- | na | 6.3E+00 | -- | -- | na | 3.0E-02 | -- | -- | na | 6.3E-01 | -- | -- | na | **6.3E-01** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | Most Limiting Allocations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH |
| Ethylbenzene | 0 | -- | -- | na | 2.1E+03 | -- | -- | na | 4.4E+04 | -- | -- | na | 2.1E+02 | -- | -- | na | 4.4E+03 | -- | -- | na | **4.4E+03** |
| Fluoranthene | 0 | -- | -- | na | 1.4E+02 | -- | -- | na | 2.9E+03 | -- | -- | na | 1.4E+01 | -- | -- | na | 2.9E+02 | -- | -- | na | **2.9E+02** |
| Fluorene | 0 | -- | -- | na | 5.3E+03 | -- | -- | na | 1.1E+05 | -- | -- | na | 5.3E+02 | -- | -- | na | 1.1E+04 | -- | -- | na | **1.1E+04** |
| Foaming Agents | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Guthion | 0 | -- | 1.0E-02 | na | -- | -- | 2.1E-01 | na | -- | -- | 2.5E-03 | na | -- | -- | 5.3E-02 | na | -- | -- | **5.3E-02** | na | **--** |
| Heptachlor [C] | 0 | 5.2E-01 | 3.8E-03 | na | 7.9E-04 | 5.7E+00 | 8.0E-02 | na | 7.9E-04 | 1.3E-01 | 9.5E-04 | na | 7.9E-05 | 1.4E+00 | 2.0E-02 | na | 7.9E-05 | **1.4E+00** | **2.0E-02** | na | **7.9E-05** |
| Heptachlor Epoxide [C] | 0 | 5.2E-01 | 3.8E-03 | na | 3.9E-04 | 5.7E+00 | 8.0E-02 | na | 3.9E-04 | 1.3E-01 | 9.5E-04 | na | 3.9E-05 | 1.4E+00 | 2.0E-02 | na | 3.9E-05 | **1.4E+00** | **2.0E-02** | na | **3.9E-05** |
| Hexachlorobenzene [C] | 0 | -- | -- | na | 2.9E-03 | -- | -- | na | 2.9E-03 | -- | -- | na | 2.9E-04 | -- | -- | na | 2.9E-04 | -- | -- | na | **2.9E-04** |
| Hexachlorobutadiene [C] | 0 | -- | -- | na | 1.8E+02 | -- | -- | na | 1.8E+02 | -- | -- | na | 1.8E+01 | -- | -- | na | 1.8E+01 | -- | -- | na | **1.8E+01** |
| Hexachlorocyclohexane Alpha-BHC [C] | 0 | -- | -- | na | 4.9E-02 | -- | -- | na | 4.9E-02 | -- | -- | na | 4.9E-03 | -- | -- | na | 4.9E-03 | -- | -- | na | **4.9E-03** |
| Hexachlorocyclohexane Beta-BHC [C] | 0 | -- | -- | na | 1.7E-01 | -- | -- | na | 1.7E-01 | -- | -- | na | 1.7E-02 | -- | -- | na | 1.7E-02 | -- | -- | na | **1.7E-02** |
| Hexachlorocyclohexane Gamma-BHC [C] (Lindane) | 0 | 9.5E-01 | na | na | 1.8E+00 | 1.0E+01 | -- | na | 1.8E+00 | 2.4E-01 | -- | na | 1.8E-01 | 2.6E+00 | -- | na | 1.8E-01 | **2.6E+00** | -- | na | **1.8E-01** |
| Hexachlorocyclopentadiene | 0 | -- | -- | na | 1.1E+03 | -- | -- | na | 2.3E+04 | -- | -- | na | 1.1E+02 | -- | -- | na | 2.3E+03 | -- | -- | na | **2.3E+03** |
| Hexachloroethane [C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+00 | -- | -- | na | 3.3E+00 | -- | -- | na | **3.3E+00** |
| Hydrogen Sulfide | 0 | -- | 2.0E+00 | na | -- | -- | 4.2E+01 | na | -- | -- | 5.0E-01 | na | -- | -- | 1.1E+01 | na | -- | -- | **1.1E+01** | na | **--** |
| Indeno (1,2,3-cd) pyrene [C] | 0 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-01 | -- | -- | na | 1.8E-02 | -- | -- | na | 1.8E-02 | -- | -- | na | **1.8E-02** |
| Iron | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Isophorone [C] | 0 | -- | -- | na | 9.6E+03 | -- | -- | na | 9.6E+03 | -- | -- | na | 9.6E+02 | -- | -- | na | 9.6E+02 | -- | -- | na | **9.6E+02** |
| Kepone | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | **--** |
| Lead | 0 | 1.4E+02 | 1.5E+01 | na | -- | 1.5E+03 | 3.1E+02 | na | -- | 3.4E+01 | 3.7E+00 | na | -- | 3.7E+02 | 7.8E+01 | na | -- | **3.7E+02** | **7.8E+01** | na | **--** |
| Malathion | 0 | -- | 1.0E-01 | na | -- | -- | 2.1E+00 | na | -- | -- | 2.5E-02 | na | -- | -- | 5.3E-01 | na | -- | -- | **5.3E-01** | na | **--** |
| Manganese | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Mercury | | 1.4E+00 | 7.7E-01 | -- | -- | 1.5E+01 | 1.6E+01 | -- | -- | 3.5E-01 | 1.9E-01 | -- | -- | 3.9E+00 | 4.0E+00 | -- | -- | **3.9E+00** | **4.0E+00** | -- | **--** |
| Methyl Bromide | 0 | -- | -- | na | 1.5E+03 | -- | -- | na | 3.2E+04 | -- | -- | na | 1.5E+02 | -- | -- | na | 3.2E+03 | -- | -- | na | **3.2E+03** |
| Methylene Chloride [C] | 0 | -- | -- | na | 5.9E+03 | -- | -- | na | 5.9E+03 | -- | -- | na | 5.9E+02 | -- | -- | na | 5.9E+02 | -- | -- | na | **5.9E+02** |
| Methoxychlor | 0 | -- | 3.0E-02 | na | -- | -- | 6.3E-01 | na | -- | -- | 7.5E-03 | na | -- | -- | 1.6E-01 | na | -- | -- | **1.6E-01** | na | **--** |
| Mirex | 0 | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | 0.0E+00 | na | -- | -- | **0.0E+00** | na | **--** |
| Nickel | 0 | 2.0E+02 | 2.2E+01 | na | 4.6E+03 | 2.2E+03 | 4.5E+02 | na | 9.7E+04 | 5.0E+01 | 5.4E+00 | na | 4.6E+02 | 5.5E+02 | 1.1E+02 | na | 9.7E+03 | **5.5E+02** | **1.1E+02** | na | **9.7E+03** |
| Nitrate (as N) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Nitrobenzene | 0 | -- | -- | na | 6.9E+02 | -- | -- | na | 1.4E+04 | -- | -- | na | 6.9E+01 | -- | -- | na | 1.4E+03 | -- | -- | na | **1.4E+03** |
| N-Nitrosodimethylamine [C] | 0 | -- | -- | na | 3.0E+01 | -- | -- | na | 3.0E+01 | -- | -- | na | 3.0E+00 | -- | -- | na | 3.0E+00 | -- | -- | na | **3.0E+00** |
| N-Nitrosodiphenylamine [C] | 0 | -- | -- | na | 6.0E+01 | -- | -- | na | 6.0E+01 | -- | -- | na | 6.0E+00 | -- | -- | na | 6.0E+00 | -- | -- | na | **6.0E+00** |
| N-Nitrosodi-n-propylamine [C] | 0 | -- | -- | na | 5.1E+00 | -- | -- | na | 5.1E+00 | -- | -- | na | 5.1E-01 | -- | -- | na | 5.1E-01 | -- | -- | na | **5.1E-01** |
| Nonylphenol | 0 | 2.8E+01 | 6.6E+00 | -- | -- | 3.1E+02 | 1.4E+02 | na | -- | 7.0E+00 | 1.7E+00 | -- | -- | 7.7E+01 | 3.5E+01 | -- | -- | **7.7E+01** | **3.5E+01** | na | **--** |
| Parathion | 0 | 6.5E-02 | 1.3E-02 | na | -- | 7.2E-01 | 2.7E-01 | na | -- | 1.6E-02 | 3.3E-03 | na | -- | 1.8E-01 | 6.8E-02 | na | -- | **1.8E-01** | **6.8E-02** | na | **--** |
| PCB Total [C] | 0 | -- | 1.4E-02 | na | 6.4E-04 | -- | 2.9E-01 | na | 6.4E-04 | -- | 3.5E-03 | na | 6.4E-05 | -- | 7.4E-02 | na | 6.4E-05 | -- | **7.4E-02** | na | **6.4E-05** |
| Pentachlorophenol [C] | 0 | 1.2E+01 | 9.0E+00 | na | 3.0E+01 | 1.3E+02 | 1.9E+02 | na | 3.0E+01 | 2.9E+00 | 2.3E+00 | na | 3.0E+00 | 3.2E+01 | 4.7E+01 | na | 3.0E+00 | **3.2E+01** | **4.7E+01** | na | **3.0E+00** |
| Phenol | 0 | -- | -- | na | 8.6E+05 | -- | -- | na | 1.8E+07 | -- | -- | na | 8.6E+04 | -- | -- | na | 1.8E+06 | -- | -- | na | **1.8E+06** |
| Pyrene | 0 | -- | -- | na | 4.0E+03 | -- | -- | na | 8.4E+04 | -- | -- | na | 4.0E+02 | -- | -- | na | 8.4E+03 | -- | -- | na | **8.4E+03** |
| Radionuclides | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Gross Alpha Activity (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Beta and Photon Activity (mrem/yr) | 0 | -- | -- | na | 4.0E+00 | -- | -- | na | 8.4E+01 | -- | -- | na | 4.0E-01 | -- | -- | na | 8.4E+00 | -- | -- | na | **8.4E+00** |
| Radium 226 + 228 (pCi/L) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |
| Uranium (ug/l) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | **--** |

| Parameter | Background | Water Quality Criteria | | | | Wasteload Allocations | | | | Antidegradation Baseline | | | | Antidegradation Allocations | | | | **Most Limiting Allocations** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (ug/l unless noted) | Conc. | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | Acute | Chronic | HH (PWS) | HH | **Acute** | **Chronic** | **HH (PWS)** | **HH** |
| Selenium, Total Recoverable | 0 | 2.0E+01 | 5.0E+00 | na | 4.2E+03 | 2.2E+02 | 1.1E+02 | na | 8.8E+04 | 5.0E+00 | 1.3E+00 | na | 4.2E+02 | 5.5E+01 | 2.6E+01 | na | 8.8E+03 | **5.5E+01** | **2.6E+01** | **na** | **8.8E+03** |
| Silver | 0 | 4.1E+00 | -- | na | -- | 4.5E+01 | -- | na | -- | 1.0E+00 | -- | na | -- | 1.1E+01 | -- | na | -- | **1.1E+01** | **--** | **na** | **--** |
| Sulfate | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| 1,1,2,2-Tetrachloroethane[C] | 0 | -- | -- | na | 4.0E+01 | -- | -- | na | 4.0E+01 | -- | -- | na | 4.0E+00 | -- | -- | na | 4.0E+00 | **--** | **--** | **na** | **4.0E+00** |
| Tetrachloroethylene[C] | 0 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+01 | -- | -- | na | 3.3E+00 | -- | -- | na | 3.3E+00 | **--** | **--** | **na** | **3.3E+00** |
| Thallium | 0 | -- | -- | na | 4.7E-01 | -- | -- | na | 9.9E+00 | -- | -- | na | 4.7E-02 | -- | -- | na | 9.9E-01 | **--** | **--** | **na** | **9.9E-01** |
| Toluene | 0 | -- | -- | na | 6.0E+03 | -- | -- | na | 1.3E+05 | -- | -- | na | 6.0E+02 | -- | -- | na | 1.3E+04 | **--** | **--** | **na** | **1.3E+04** |
| Total dissolved solids | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Toxaphene [C] | 0 | 7.3E-01 | 2.0E-04 | na | 2.8E-03 | 8.0E+00 | 4.2E-03 | na | 2.8E-03 | 1.8E-01 | 5.0E-05 | na | 2.8E-04 | 2.0E+00 | 1.1E-03 | na | 2.8E-04 | **2.0E+00** | **1.1E-03** | **na** | **2.8E-04** |
| Tributyltin | 0 | 4.6E-01 | 7.2E-02 | na | -- | 5.1E+00 | 1.5E+00 | na | -- | 1.2E-01 | 1.8E-02 | na | -- | 1.3E+00 | 3.8E-01 | na | -- | **1.3E+00** | **3.8E-01** | **na** | **--** |
| 1,2,4-Trichlorobenzene | 0 | -- | -- | na | 7.0E+01 | -- | -- | na | 1.5E+03 | -- | -- | na | 7.0E+00 | -- | -- | na | 1.5E+02 | **--** | **--** | **na** | **1.5E+02** |
| 1,1,2-Trichloroethane[C] | 0 | -- | -- | na | 1.6E+02 | -- | -- | na | 1.6E+02 | -- | -- | na | 1.6E+01 | -- | -- | na | 1.6E+01 | **--** | **--** | **na** | **1.6E+01** |
| Trichloroethylene [C] | 0 | -- | -- | na | 3.0E+02 | -- | -- | na | 3.0E+02 | -- | -- | na | 3.0E+01 | -- | -- | na | 3.0E+01 | **--** | **--** | **na** | **3.0E+01** |
| 2,4,6-Trichlorophenol [C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+00 | -- | -- | na | 2.4E+00 | **--** | **--** | **na** | **2.4E+00** |
| 2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex) | 0 | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | -- | -- | na | -- | **--** | **--** | **na** | **--** |
| Vinyl Chloride[C] | 0 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+01 | -- | -- | na | 2.4E+00 | -- | -- | na | 2.4E+00 | **--** | **--** | **na** | **2.4E+00** |
| Zinc | 0 | 1.3E+02 | 1.3E+02 | na | 2.6E+04 | 1.4E+03 | 2.6E+03 | na | 5.5E+05 | 3.2E+01 | 3.1E+01 | na | 2.6E+03 | 3.5E+02 | 6.6E+02 | na | 5.5E+04 | **3.5E+02** | **6.6E+02** | **na** | **5.5E+04** |

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

| Metal | Target Value (SSTV) |
|---|---|
| Antimony | 1.3E+03 |
| Arsenic | 3.7E+02 |
| Barium | na |
| Cadmium | 3.8E+00 |
| Chromium III | 2.5E+02 |
| Chromium VI | 1.8E+01 |
| Copper | 1.6E+01 |
| Iron | na |
| Lead | 4.7E+01 |
| Manganese | na |
| Mercury | 1.5E+00 |
| Nickel | 6.8E+01 |
| Selenium | 1.6E+01 |
| Silver | 4.5E+00 |
| Zinc | 1.4E+02 |

Note: do not use QL's lower than the minimum QL's provided in agency guidance

## 1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

| | Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 10.000 | 10.000 | 11.000 | 11.000 |
| 7Q10 | 20.000 | N/A | 21.000 | N/A |
| 30Q10 | 20.000 | 20.000 | 21.000 | 21.000 |
| 30Q5 | 20.000 | N/A | 21.000 | N/A |
| Harm. Mean | 0.000 | N/A | 1.000 | N/A |
| Annual Avg. | 0.000 | N/A | 1.000 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 27.273 | 25.273 |
| 30Q10 90th% Temp. Mix (deg C) | 27.143 | 25.143 |
| 1Q10 90th% pH Mix (SU) | 8.622 | 8.622 |
| 30Q10 90th% pH Mix (SU) | 8.657 | 8.657 |
| 1Q10 10th% pH Mix (SU) | 7.300 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.300 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) | 111.1 | 111.1 |
| 7Q10 Hardness (mg/L as CaCO3) | 107.7 | 107.7 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 27.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.263 |
| MAX | 27.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.370 |
| Early LS Absent Criterion (mg N/ | 0.370 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.370 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 25.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.437 |
| MAX | 25.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.421 |
| Early LS Absent Criterion (mg N/ | 0.421 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.421 |

## 1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

| | 100% Stream Flows Allocated to Mix (MGD) | | Total Mix Flows Stream + Discharge (MGD) | |
|---|---|---|---|---|
| | Dry Season | Wet Season | Dry Season | Wet Season |
| 1Q10 | 10.000 | 10.000 | 11.000 | 11.000 |
| 7Q10 | 20.000 | N/A | 21.000 | N/A |
| 30Q10 | 20.000 | 20.000 | 21.000 | 21.000 |
| 30Q5 | 20.000 | N/A | 21.000 | N/A |
| Harm. Mean | 0.000 | N/A | 1.000 | N/A |
| Annual Avg. | 0.000 | N/A | 1.000 | N/A |

Stream/Discharge Mix Values

| | Dry Season | Wet Season |
|---|---|---|
| 1Q10 90th% Temp. Mix (deg C) | 27.273 | 25.273 |
| 30Q10 90th% Temp. Mix (deg C) | 27.143 | 25.143 |
| 1Q10 90th% pH Mix (SU) | 8.622 | 8.622 |
| 30Q10 90th% pH Mix (SU) | 8.657 | 8.657 |
| 1Q10 10th% pH Mix (SU) | 7.300 | N/A |
| 7Q10 10th% pH Mix (SU) | 7.300 | N/A |

| | Calculated | Formula Inputs |
|---|---|---|
| 1Q10 Hardness (mg/L as CaCO3) = | 111.091 | 111.091 |
| 7Q10 Hardness (mg/L as CaCO3) = | 107.714 | 107.714 |

**Ammonia - Dry Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Dry Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 27.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.263 |
| MAX | 27.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.370 |
| Early LS Absent Criterion (mg N/ | 0.370 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.370 |

**Ammonia - Wet Season - Acute**

| | |
|---|---|
| 90th Percentile pH (SU) | 8.622 |
| (7.204 - pH) | -1.418 |
| (pH - 7.204) | 1.418 |
| Trout Present Criterion (mg N/l | 1.699 |
| Trout Absent Criterion (mg N/L | 2.544 |
| Trout Present? | n |
| Effective Criterion (mg N/L) | 2.544 |

**Ammonia - Wet Season - Chronic**

| | |
|---|---|
| 90th Percentile Temp. (deg C) | 25.143 |
| 90th Percentile pH (SU) | 8.657 |
| MIN | 1.437 |
| MAX | 25.143 |
| (7.688 - pH) | -0.969 |
| (pH - 7.688) | 0.969 |
| Early LS Present Criterion (mg N | 0.421 |
| Early LS Absent Criterion (mg N/ | 0.421 |
| Early Life Stages Present? | y |
| Effective Criterion (mg N/L) | 0.421 |

2/27/2015 6:10:43 PM

Facility = GP Big Island (Outfall 003)
Chemical = ammonia (mg/L)
Chronic averaging period = 30
WLAa = 6.5
WLAc = 1.7
Q.L. = 0.1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

# observations = 5
Expected Value = .101337
Variance = .003696
C.V. = 0.6
97th percentile daily values = .246595
97th percentile 4 day average = .168603
97th percentile 30 day average= .122218
# < Q.L. = 3
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0.78
0
0
0.66
0

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days |
| BOD5 | 5.0 | 3.0 |
| TSS | 5.0 | 3.0 |
| pH | (1) | (1) |
| Setteable Solids | (2) | (2) |

[1] Within the range of 6.0 to 9.0 at all times.
[2] Not to exceed 0.2 ml/l.

(b) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days limitations but shall be subject to annual average effluent limitations:

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average days) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 13.7 | 7.1 | 4.0 |
| TSS | 17.05 | 9.2 | 5.1 |
| pH | (1) | (1) | (1) |

[1] Within the range of 5.0 to 9.0 at all times.

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average days) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 4.4 | 2.3 | 1.3 |
| TSS | 10.8 | 5.8 | 3.2 |
| pH | (1) | (1) | (1) |

[1] Within the range of 5.0 to 9.0 at all times.

### § 430.103 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in 40 CFR 401.16) in § 430.102 of this subpart for the best practicable control technology currently available (BPT).

(b) For secondary fiber non-deink facilities where paperboard from wastepaper is produced, non-continuous dischargers shall not be subject to the maximum day and average-of-30-consecutive-days limitations, but shall be subject to annual average effluent limitations determined by dividing the average-of-30-consecutive-days limitations for BOD5 and TSS by 1.77 and 2.18.

(c) For secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced, non-continuous dischargers shall not be subject to the maximum day and average-of-30-consecutive-days limitations, but shall be subject to annual average effluent limitations determined by dividing the average-of-30-consecutive-days limitations for BOD5 and TSS by 1.90 and 1.90.

### § 430.104 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart where chlorophenolic-containing biocides are used must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). Non-continuous dischargers shall not be subject to the maximum day mass limitations in kg/kkg (lb/1000 lb) but shall be subject to concentration limitations. Concentration limitations are only applicable to non-continuous dischargers. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where paperboard from wastepaper is produced]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.00087 | (0.029)(7.2)/y |
| Trichlorophenol | 0.00030 | (0.010)(7.2)/y |
| y = wastewater discharged in kgal per ton of product. | | |

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0017 | (0.029)(14.4)/y |
| Trichlorophenol | 0.00060 | (0.010)(14.4)/y |
| y = wastewater discharged in kgal per ton of product. | | |

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0030 | (0.029)(25.2)/y |
| Trichlorophenol | 0.0011 | (0.010)(25.2)/y |

y = wastewater discharged in kgal per ton of product.

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0026 | (0.029)(21.1)/y |
| Trichlorophenol | 0.00088 | (0.010)(21.1)/y |

y = wastewater discharged in kgal per ton of product.

**§ 430.105 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD5 and TSS, but shall be subject to annual average effluent limitations. Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART J

[NSPS for secondary fiber non-deink facilities where paperboard from wastepaper is produced—noncorrugating medium furnish subdivision]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 2.6 | 1.4 | 0.73 |
| TSS | 3.5 | 1.8 | 0.95 |
| pH | (1) | (1) | (1) |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.00087 | (0.065)(3.2)/y |
| Trichlorophenol | 0.00030 | (0.023)(3.2)/y |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| y = wastewater discharged in kgal per ton at all times. | | |

[1] Within the range of 5.0 to 9.0 at all times.

## SUBPART J

[NSPS for secondary fiber non-deink facilities where paperboard from wastepaper is produced—corrugating medium finish subdivision]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 3.9 | 2.1 | 1.1 |
| TSS | 4.4 | 2.3 | 1.2 |
| pH | (1) | (1) | (1) |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.00087 | (0.065)(3.2)/y |
| Trichlorophenol | 0.00030 | (0.023)(3.2)/y |
| y = wastewater discharged in kgal per ton at all times. | | |

[1] Within the range of 5.0 to 9.0 at all times.

## SUBPART J

[NSPS for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 1.7 | 0.94 | 0.49 |
| TSS | 2.7 | 1.40 | 0.74 |
| pH | (1) | (1) | (1) |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0017 | (0.155)(2.7)/y |
| Trichlorophenol | 0.00060 | (0.053)(2.7)/y |
| y = wastewater discharged in kgal per ton at all times. | | |

[1] Within the range of 5.0 to 9.0 at all times.

J

SUBPART J

[NSPS for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 4.6 | 2.5 | 1.3 |
| TSS | 10.2 | 5.3 | 2.8 |
| pH | (1) | (1) | (1) |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0030 | (0.045)(16.3)/y |
| Trichlorophenol | 0.0011 | (0.015)(16.3)/y |

y = wastewater discharged in kgal per ton at all times.

(1) Within the range of 5.0 to 9.0 at all times.

SUBPART J

[NSPS for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 2.1 | 1.1 | 0.58 |
| TSS | 4.4 | 2.3 | 1.21 |
| pH | (1) | (1) | (1) |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0026 | (0.107)(5.7)/y |
| Trichlorophenol | 0.00088 | (0.037)(5.7)/y |

y = wastewater discharged in kgal per ton at all times.

(1) Within the range of 5.0 to 9.0 at all times.

**§ 430.106 Pretreatment standards for existing sources (PSES).**

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must: Comply with 40 CFR part 403; and achieve the following pretreatment standards for existing sources (PSES) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. PSES must be attained on or before July 1, 1984:

## Subpart J—Secondary Fiber Non-Deink Subcategory

### § 430.100 Applicability; description of the secondary fiber non-deink subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of: Paperboard from wastepaper; tissue paper from wastepaper without deinking at secondary fiber mills; molded products from wastepaper without deinking at secondary fiber mills; and builders' paper and roofing felt from wastepaper.

### § 430.101 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 of this part shall apply to this subpart.

(b) Noncorrugating medium furnish subdivision mills are mills where recycled corrugating medium is not used in the production of paperboard.

(c) Corrugating medium furnish subdivision mills are mills where only recycled corrugating medium is used in the production of paperboard.

### § 430.102 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where paperboard from wastepaper is produced—noncorrugating medium finish subdivision]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days |
| BOD5 | 3.0 | 1.5 |
| TSS | 5.0 | 2.5 |
| pH | (1) | (1) |

[1] 1Within the range of 6.0 to 9.0 at all times.

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where paperboard from wastepaper is produced—corrugating medium finish subdivision]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days |
| BOD5 | 5.7 | 2.8 |
| TSS | 9.2 | 4.6 |
| pH | (1) | (1) |

[1] Within the range of 6.0 to 9.0 at all times.

SUBPART J

[PSES for secondary fiber non-deink facilities where paperboard from wastepaper is produced]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product[a] |
| Pentachlorophenol | (0.032)(7.2)/y | 0.00096 |
| Trichlorophenol | (0.010)(7.2)/y | 0.00030 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSES for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product[a] |
| Pentachlorophenol | (0.032)(14.4)y | 0.0019 |
| Trichlorophenol | (0.010)(14.4)y | 0.00060 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSES for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product[a] |
| Pentachlorophenol | (0.032)(25.2)y | 0.0034 |
| Trichlorophenol | (0.010)(25.2)/y | 0.0011 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSES for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product[a] |
| Pentachlorophenol | (0.032)(21.1)y | 0.0028 |
| Trichlorophenol | (0.010)(21.1)y | 0.00088 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

**§ 430.107 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must: Comply with 40 CFR part 403; and achieve the following pretreatment standards for new sources (PSNS) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides

J

must certify to the permit-issuing authority that they are not using these biocides:

SUBPART J

[PSNS for secondary fiber non-deink facilities where paperboard from wastepaper is produced]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product [a] |
| Pentachlorophenol | (0.072)(3.2)/y | 0.00096 |
| Trichlorophenol | (0.023)(3.2)/y | 0.00030 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSNS for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product [a] |
| Pentachlorophenol | (0.171)(2.7)/y | 0.0019 |
| Trichlorophenol | (0.053)(2.7)/y | 0.00060 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSNS for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product [a] |
| Pentachlorophenol | (0.049)(16.3)/y | 0.0034 |
| Trichlorophenol | (0.015)(16.3)/y | 0.0011 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSNS for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

| Pollutant or pollutant property | Maximum for any 1 day | |
|---|---|---|
| | Milligrams/liter (mg/l) | Kg/kkg (or pounds per 1,000 lb) of product [a] |
| Pentachlorophenol | (0.118)(5.7)/y | 0.0028 |
| Trichlorophenol | (0.037)(5.7)/y | 0.00088 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

| Effluent characteristic | Effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days shall not exceed— |
| TSS | 0.50 | 0.25 |
| Total phosphorus (as P) | .80 | .40 |
| Fluoride (as F) | .30 | .15 |
| pH | (1) | (1) |

[1] Within the range 6.0 to 9.5.

### § 422.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

| Effluent characteristic | Effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days shall not exceed— |
| Total phosphorus (as P) | 0.56 | 0.28 |
| Fluoride (as F) | .21 | .11 |

[44 FR 50744, Aug. 29, 1979]

### § 422.64 [Reserved]

### § 422.65 Standards of performance for new sources.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the standards of performance for new sources:

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

| Effluent characteristic | Effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days shall not exceed— |
| TSS | 0.35 | 0.18 |

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

| Effluent characteristic | Effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days shall not exceed— |
| Total phosphorus (as P) | .56 | .28 |
| Fluoride (as F) | .21 | .11 |
| pH | (1) | (1) |

[1] Within the range 6.0 to 9.5.

### § 422.66 [Reserved]

### § 422.67 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, the following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best conventional pollutant control technology:

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

| Effluent characteristic | Effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days shall not exceed— |
| TSS | 0.35 | 0.18 |
| pH | (1) | (1) |

[1] Within the range 6.0 to 9.5.

[51 FR 25000, July 9, 1986]

## PART 423—STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

Sec.





423

AUTHORITY: Secs. 301; 304(b), (c), (e), and (g); 306(b) and (c); 307(b) and (c); and 501, Clean Water Act (Federal Water Pollution Control Act Amendments of 1972, as amended by Clean Water Act of 1977) (the "Act"; 33 U.S.C. 1311; 1314(b), (c), (e), and (g); 1316(b) and (c); 1317(b) and (c); and 1361; 86 Stat. 816, Pub. L. 92–500; 91 Stat. 1567, Pub. L. 95–217), unless otherwise noted.

SOURCE: 47 FR 52304, Nov. 19, 1982, unless otherwise noted.

### § 423.10 Applicability.

The provisions of this part are applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium.

### § 423.11 Specialized definitions.

In addition to the definitions set forth in 40 CFR part 401, the following definitions apply to this part:

(a) The term *total residual chlorine* (or total residual oxidants for intake water with bromides) means the value obtained using the amperometric method for total residual chlorine described in 40 CFR part 136.

(b) The term *low volume waste sources* means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this part. Low volume wastes sources include, but are not limited to: wastewaters from wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes are not included.

(c) The term *chemical metal cleaning waste* means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning.

(d) The term *metal cleaning waste* means any wastewater resulting from cleaning [with or without chemical cleaning compounds] any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.

(e) The term *fly ash* means the ash that is carried out of the furnace by the gas stream and collected by mechanical precipitators, electrostatic precipitators, and/or fabric filters. Economizer ash is included when it is collected with fly ash.

(f) The term *bottom ash* means the ash that drops out of the furnace gas stream in the furnace and in the economizer sections. Economizer ash is included when it is collected with bottom ash.

(g) The term *once through cooling water* means water passed through the main cooling condensers in one or two passes for the purpose of removing waste heat.

(h) The term *recirculated cooling water* means water which is passed through the main condensers for the purpose of removing waste heat, passed through a cooling device for the purpose of removing such heat from the water and then passed again, except for blowdown, through the main condenser.

(i) The term *10 year, 24/hour rainfall event* means a rainfall event with a probable recurrence interval of once in ten years as defined by the National Weather Service in Technical Paper No. 40. *Rainfall Frequency Atlas of the United States,* May 1961 or equivalent regional rainfall probability information developed therefrom.

(j) The term *blowdown* means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding

limits established by best engineering practices.

(k) The term *average concentration* as it relates to chlorine discharge means the average of analyses made over a single period of chlorine release which does not exceed two hours.

(l) The term *free available chlorine* shall mean the value obtained using the amperometric titration method for free available chlorine described in *Standard Methods for the Examination of Water and Wastewater*, page 112 (13th edition).

(m) The term *coal pile runoff* means the rainfall runoff from or through any coal storage pile.

### § 423.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

(a) In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, utilization of facilities, raw materials, manufacturing processes, nonwater quality environmental impacts, control and treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES Permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The phrase "other such factors" appearing above may include significant cost differentials. In no event may a discharger's impact on receiving water quality be considered as a factor under this paragraph.

(b) Any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction by the application of the best practicable control technology currently available (BPT):

(1) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(2) There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

(3) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration lised in the following table:

| Pollutant or pollutant property | BPT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day (mg/l) | Average of daily values for 30 consecutive days shall not exceed (mg/l) |
| TSS | 100.0 | 30.0 |
| Oil and grease | 20.0 | 15.0 |

(4) The quantity of pollutants discharged in fly ash and bottom ash transport water shall not exceed the quantity determined by multiplying the flow of fly ash and bottom ash transport water times the concentration listed in the following table:

| Pollutant or pollutant property | BPT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day (mg/l) | Average of daily values for 30 consecutive days shall not exceed (mg/l) |
| TSS | 100.0 | 30.0 |
| Oil and grease | 20.0 | 15.0 |

(5) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

| Pollutant or pollutant property | BPT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day (mg/l) | Average of daily values for 30 consecutive days shall not exceed (mg/l) |
| TSS | 100.0 | 30.0 |
| Oil and grease | 20.0 | 15.0 |
| Copper, total | 1.0 | 1.0 |
| Iron, total | 1.0 | 1.0 |

(6) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentation listed in the following table:

| Pollutant or pollutant property | BPT effluent limitations | |
|---|---|---|
| | Maximum concentration (mg/l) | Average concentration (mg/l) |
| Free available chlorine | 0.5 | 0.2 |

(7) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

| Pollutant or pollutant property | BPT effluent limitations | |
|---|---|---|
| | Maximum concentration (mg/l) | Average concentration (mg/l) |
| Free available chlorine | 0.5 | 0.2 |

(8) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level or chlorination.

(9) Subject to the provisions of paragraph (b)(10) of this section, the following effluent limitations shall apply to the point source discharges of coal pile runoff:

| Pollutant or pollutant property | BPT effluent limitations |
|---|---|
| | Maximum concentration for any tims (mg/l) |
| TSS | 50 |

(10) Any untreated overflow from facilities designed, constructed, and operated to treat the volume of coal pile runoff which is associated with a 10 year, 24 hour rainfall event shall not be subject to the limitations in paragraph (b)(9) of this section.

(11) At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified in paragraphs (b)(3) through (7) of this section. Concentration limitations shall be those concentrations specified in this section.

(12) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (b)(1) through (11) of this section attributable to each controlled waste source shall not exceed the specified limitations for that waste source.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2000–0194)

[47 FR 52304, Nov. 19, 1982. as amended at 48 FR 31404, July 8, 1983]

### § 423.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point

(c) An indirect discharger must demonstrate compliance with the pretreatment standards in paragraphs (a)(2) or (a)(3) of this section, as applicable, by monitoring for all pollutants at the point where the wastewater containing those pollutants leaves the bleach plant.

[63 FR 18635, Apr. 15, 1998; 63 FR 42240, Aug. 7, 1998]

### § 430.58 Best management practices (BMPs).

The definitions and requirements set forth in 40 CFR 430.03 apply to facilities in this subpart.

## Subpart F—Semi-Chemical Subcategory

### § 430.60 Applicability; description of the semi-chemical subcategory.

The provisions of this subpart are applicable to discharges resulting from the integrated production of pulp and paper at semi-chemical mills.

### § 430.61 Specialized definitions.

For the purpose of this subpart, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 of this part shall apply to this subpart.

### § 430.62 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

SUBPART F

[BPT effluent limitations for ammonia base mills]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days |
| BOD5 | 8.0 | 4.0 |
| TSS | 10.0 | 5.0 |
| pH | (1) | (1) |

[1] Within the range of 6.0 to 9.0 at all times.

SUBPART F

[BPT effluent limitations for sodium base mills]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | |
|---|---|---|
| | Maximum for any 1 day | Average of daily values for 30 consecutive days |
| BOD5 | 8.7 | 4.35 |
| TSS | 11.0 | 5.5 |
| pH | (1) | (1) |

[1] Within the range of 6.0 to 9.0 at all times.

### § 430.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in 40 CFR 401.16) in § 430.62 of this subpart for the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and average-of-30-consecutive-days limitations, but shall be subject to annual average effluent limitations determined by dividing the average-of-30-consecutive-days limitations for BOD5 by 1.36 and TSS by 1.36.

### § 430.64 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart where chlorophenolic-containing biocides are used must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). Non-continuous dischargers shall not be subject to the maximum day mass limitations in kg/kkg (lb/1,000 lb), but shall be subject to concentration limitations. Concentration limitations are only applicable to non-continuous dischargers. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART F

| Pollutant or pollutant property | BAT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | |
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0012 | (0.029)(10.3)/y |
| Trichlorophenol | 0.00043 | (0.010)(10.3)/y |
| y = wastewater discharged in kgal per ton of product. | | |

### § 430.65 New source performance standards (NSPS).

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD5 and TSS, but shall be subject to annual average effluent limitations. Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

F

SUBPART F
[NSPS]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 3.0 | 1.6 | 0.84 |
| TSS | 5.8 | 3.0 | 1.6 |
| pH | (1) | (1) | (1) |

| | Maximum for any 1 day | |
|---|---|---|
| | Kg/kkg (or pounds per 1,000 lb) of product | Milligrams/liter |
| Pentachlorophenol | 0.0012 | (0.041)(7.3)/y |
| Trichlorophenol | 0.00043 | (0.014)(7.3)/y |

y = wastewater discharged in kgal per ton at all times.

(1) Within the range of 5.0 to 9.0 at all times.

**§ 430.66 Pretreatment standards for existing sources (PSES).**

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must: comply with 40 CFR part 403; and achieve the following pretreatment standards for existing sources (PSES) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. PSES must be attained on or before July 1, 1984:

SUBPART F

| Pollutant or pollutant property | PSES | |
|---|---|---|
| | Maximum for any 1 day | |
| | Milligrams/liter | Kg/kkg (or pounds per 1,000 lb) of product[a] |
| Pentachlorophenol | (0.032)(10.3)/y | 0.0014 |
| Trichlorophenol | (0.010)(10.3)/y | 0.00043 |

y = wastewater discharged in kgal per ton of product.

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass equivalent limitations.

**§ 430.67 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must: comply with 40 CFR part 403; and achieve the following pretreatment standards for new sources (PSNS) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:



F

SUBPART F

| Pollutant or pollutant property | PSNS | |
|---|---|---|
| | Maximum for any 1 day | |
| | Milligrams/liter | Kg/kkg (or pounds per 1,000 lb) of product [a] |
| Pentachlorophenol | (0.045)(7.3)/y | 0.0014 |
| Trichlorophenol | (0.014)(7.3)/y | 0.00043 |
| y = wastewater discharged in kgal per ton of product. | | |

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass equivalent limitations.

## Subpart G—Mechanical Pulp Subcategory

### § 430.70 Applicability; description of the mechanical pulp subcategory.

The provisions of this subpart are applicable to discharges resulting from: the production of pulp and paper at groundwood chemi-mechanical mills; the production of pulp and paper at groundwood mills through the application of the thermo-mechanical process; the integrated production of pulp and coarse paper, molded pulp products, and newsprint at groundwood mills; and the integrated production of pulp and fine paper at groundwood mills.

### § 430.71 Specialized definitions.

For the purpose of this subpart, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 of this part shall apply to this subpart.

### § 430.72 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days limitations but shall be subject to annual average effluent limitations:

SUBPART G

[BPT effluent limitations for mechanical pulp facilities where pulp and paper at groundwood chemi-mechanical mills are produced]

| Pollutant or pollutant property | Kg/kkg (or pounds per 1,000 lb) of product | | |
|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers (annual average) |
| | Maximum for any 1 day | Average of daily values for 30 consecutive days | |
| BOD5 | 13.5 | 7.05 | 3.96 |
| TSS | 19.75 | 10.65 | 5.85 |
| pH | (1) | (1) | (1) |

[1] Within the range of 5.0 to 9.0 at all times.



F

# Attachment K

## Toxicity Testing

- **Toxicity Testing Limit Justification Memorandum**

**<u>Outfall 003</u>**

- **Acute Chronic Toxicity Endpoint Spreadsheet (WETLIM10)**
- **STATS Program Output**

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
*Blue Ridge Regional Office*

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: WET Testing Limit Justification for GP Big Island, LLC
VPDES Permit No. VA0003026

TO: Permit File

FROM: Becky L. France, Water Permit Writer

DATE: January 29, 2015

**INTRODUCTION:**

GP Big Island, LLC operates a pulp and paper mill in Big Island, Virginia which produces corrugated paper medium via a semi-chemical process and linerboard from recycled corrugated cardboard. Table 1 summarizes the facility information. The permit for this facility was reissued on June 30, 2010 and included whole effluent toxicity testing requirements for outfall 003 which is summarized in Table 1.

**TOXICITY EVALUATION / DISCUSSION:**

Table 2 includes a compilation of the chronic toxicity testing data since August 2005. Revised flow data for outfall 003 were input into the WETLIM10 spreadsheet to calculate a wasteload allocation and determine if the limit is sufficiently stringent. Using revised effluent and stream data, the WETLIM10 spreadsheet was revised to calculate a wasteload allocation. The wasteload allocations and a value to force a limit were entered into the STATS program to determine if the current limit is stringent enough. The calculated limit from the STATS program was converted to NOEC 100/$TU_c$), and then rounded up to the nearest whole numbers. The $TU_c$ was back calculated from the rounded NOEC (100/NOEC). This resulting value of 25.0 $TU_c$ is the same as the previous limit. Therefore, the limit has been carried forward from the previous permit.

Guidance Memo 00-2012 designates criteria to allow testing of only one species per test type rather than two species. The criteria designate one of two conditions that need to be met: (1) the average percent survival in 100% effluent for all the acceptable acute tests during a permit term with a particular species is $\geq$ 100, or (2) the average percent survival in 100% effluent for all of the acceptable chronic tests during a permit term with a particular species is $\geq$ 80% and the secondary endpoint for reproduction or growth is an NOEC=100%. If the criteria indicate that there is no possibility for toxicity from tests with the evaluated species, annual testing with the other tested species should be sufficient. There was no toxicity noted in any of the chronic testing conducted during the permit term. Therefore, the permittee is eligible for testing of only one species. Based upon all the test results, *Ceriodaphnia dubia* appears to have experienced more toxic effects. Therefore, chronic toxicity testing will be required for *Ceriodaphnia dubia* only. The monitoring frequency shall continue to be annual.

Table 1 **FACILITY INFORMATION**

**FACILITY:** GP Big Island, LLC

**LOCATION:** 9363 Lee Jackson Highway (Big Island)

**VPDES PERMIT NUMBER:** VA0003026 **Expiration Date:** 03/31/20

**SIC CODE/DESCRIPTION:** 2631/Paperboard Mill
**OUTFALL/FLOWS (MGD) (30 Day Max Ave.):** Outfall 003 = 8.91 MGD

**RECEIVING STREAM/CRITICAL FLOWS/IWC:**

| | |
|---|---|
| Receiving Stream: | James River |
| River Basin: | James River |
| Subbasin: | NA |
| Section: | 11 |
| Class: | III |
| Special Standards: | none |

Outfall 003
7Q10 = 258 MGD
1Q10 = 203 MGD
30Q5 = 388 MGD
IWC = 3.34% (7Q10) (003)
Diffuser Acute Ratio 11:1
Chronic Ratio 21:1

**WASTEWATER TREATMENT:**

Outfall 003 treatment consists of primary equalization basins, secondary sewage treatment with chlorination, activated sludge, secondary clarifier, and tertiary polishing pond.

**TMP REQUIREMENTS (6/2010-3/2015)**

Biological Monitoring

003: Annual chronic tests on 24-hour composite samples alternating between *Ceriodaphnia dubia* and *Pimephales promelas*.

## TOXICITY TEST DATA

Table 3 Chronic Toxicity Test Results for GP Big Island, VA0003026, Outfall 003

| Test Date | Test Organism | $TU_c$ | NOEC % Survival | NOEC % Growth/ Reproduction | $LC_{50}$ |
|---|---|---|---|---|---|
| Aug 2005 (R) | *C. dubia* | 5.0 | 100 | 20 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Nov 2005 (R) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Feb 2006 (R) | *C. dubia* | 5.0 | 100 | 20 | >100 |
| | *P. promelas* | 5.0 | 20 | 20 | >100 |
| May 2006 (R) | *C. dubia* | 5.0 | 100 | 20 | >100 |
| | *P. promelas* | 5.0 | 100 | 20 | >100 |
| Aug 2006 (R) | *C. dubia* | 5.0 | 100 | 20 | >100 |
| | *P. promelas* | 5.0 | 20 | 20 | >100 |
| Dec 2006 (R) | *C. dubia* | 5.0 | 100 | 20 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Apr 2006 (O) | *C. dubia* | 5.0 | 100 | 20 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Oct 2007 (O) | *C. dubia* | 1.0 | 100 | 100 | 100 |
| | *P. promelas* | 1.0 | 100 | 100 | 90 |
| Apr 2008 (O) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 95 | >100 |
| Oct 2008 (O) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Jun 2009 (O) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Jul 2009 (C) | *C. dubia* | 1.0 | 100 | 20 | >100 |
| | *P. promelas* | 1.0 | 100 | 20 | >100 |
| Oct 2009 (C) | *C. dubia* | 5.0 | 20 | 20 | 48.9 |
| | *P. promelas* | 1.0 | 100 | 100 | 100 |
| Feb 2010 (C) | *C. dubia* | 5.0 | 20 | 20 | >100 |
| | *P. promelas* | 5.0 | 100 | 20 | >100 |

R= testing by REI Consultants; O=Olver Inc.; C= Coastal Bioanalysts, Inc.

Table 3 Chronic Toxicity Test Results for GP Big Island, VA0003026, Outfall 003

| Test Date | Test Organism | $TU_c$ | NOEC % Survival | NOEC % Growth/ Reproduction | $LC_{50}$ |
|---|---|---|---|---|---|
| May 2011 (R) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| Nov 2012 (R) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| May 2013 (R) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |
| May 2014 (R) | *C. dubia* | 1.0 | 100 | 100 | >100 |
| | *P. promelas* | 1.0 | 100 | 100 | >100 |

# Spreadsheet for determination of WET test endpoints or WET limits

**Excel 97**
**Revision Date: 01/10/05**
**File: WETLIM10.xls**
**(MIX.EXE required also)**

**Enter data in the cells with blue type:**

| | |
|---|---|
| Entry Date: | 01/21/15 |
| Facility Name: | GP Big Island |
| VPDES Number: | **VA0003026** |
| Outfall Number: | 3 |

| | | |
|---|---|---|
| Plant Flow: | **8.91** | MGD |
| Acute 1Q10: | **203** | MGD |
| Chronic 7Q10: | **254** | MGD |

**Acute Endpoint/Permit Limit** — **Use as $LC_{50}$ in Special Condition, as TUa on DMR**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **ACUTE** | **3.07140684** | **TUa** | **$LC_{50}$ =** | **33** | % Use as | **3.03** | **TUa** |

**ACUTE WLAa** **3.3**

Note: Inform the permittee that if the mean of the data exceeds this TUa: **1.0** a limit may result using WLA.EXE

**Chronic Endpoint/Permit Limit** — **Use as NOEC in Special Condition, as TUc on DMR**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CHRONIC** | **30.7140684** | **$TU_c$** | **NOEC =** | **4** | % Use as | **25.00** | **$TU_c$** |
| **BOTH*** | **33.0000008** | **$TU_c$** | **NOEC =** | **4** | % Use as | **25.00** | **$TU_c$** |
| **AML** | **30.7140684** | **$TU_c$** | **NOEC =** | **4** | % Use as | **25.00** | **$TU_c$** |

**ACUTE WLAa,c** **33**
**CHRONIC WLAc** **21**
* Both means acute expressed as chronic

Note: Inform the permittee that if the mean of the data exceeds this TUc: **12.6217827** a limit may result using WLA.EXE

**% Flow to be used from MIX.EXE**

| | | |
|---|---|---|
| Acute | **100** | % |
| Chronic | **100** | % |

**Difuser /modeling study?**

| | |
|---|---|
| Enter Y/N | **Y** |
| Acute | 11 :1 |
| Chronic | 21 :1 |

Are data available to calculate CV? (Y/N) **N** (Minimum of 10 data points, same species, needed) Go to Page 2
Are data available to calculate ACR? (Y/N) **N** (NOEC<LC50, do not use greater/less than data) Go to Page 3

| | | |
|---|---|---|
| $IWC_a$ | 9.090909091 | % Plant flow/plant flow + 1Q10 |
| $IWC_c$ | 4.761904762 | % Plant flow/plant flow + 7Q10 |

**NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use**

| | | |
|---|---|---|
| Dilution, acute | 11 | 100/IWCa |
| Dilution, chronic | 21 | 100/IWCc |

| | | |
|---|---|---|
| $WLA_a$ | 3.3 | Instream criterion (0.3 TUa) X's Dilution, acute |
| $WLA_c$ | 21 | Instream criterion (1.0 TUc) X's Dilution, chronic |
| $WLA_{a,c}$ | 33 | ACR X's $WLA_a$ - converts acute WLA to chronic units |

| | | |
|---|---|---|
| ACR -acute/chronic ratio | 10 | LC50/NOEC (Default is 10 - if data are available, use tables Page 3) |
| CV-Coefficient of variation | 0.6 | Default of 0.6 - if data are available, use tables Page 2) |

| | | | |
|---|---|---|---|
| Constants | eA | 0.4109447 | Default = 0.41 |
| | eB | 0.6010373 | Default = 0.60 |
| | eC | 2.4334175 | Default = 2.43 |
| | eD | 2.4334175 | Default = 2.43 (1 samp) |

No. of sample: 1

****The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.**

| | | | | | |
|---|---|---|---|---|---|
| $LTA_{a,c}$ | 13.5611751 | WLAa,c X's eA | | | |
| $LTA_c$ | 12.6217833 | WLAc X's eB | | | |
| MDL** with $LTA_{a,c}$ | 33.00000081 | $TU_c$ | NOEC = | 3.030303 | (Protects from acute/chronic toxicity) |
| MDL** with $LTA_c$ | 30.71406836 | $TU_c$ | NOEC = | 3.255837 | (Protects from chronic toxicity) |
| AML with lowest LTA | 30.71406836 | $TU_c$ | NOEC = | 3.255837 | Lowest LTA X's eD |

Rounded NOEC's %
NOEC = 4 %
NOEC = 4 %
NOEC = 4

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM $TU_c$ to $TU_a$

| | | | | | |
|---|---|---|---|---|---|
| MDL with $LTA_{a,c}$ | 3.300000081 | $TU_a$ | LC50 = | 30.303030 | % |
| MDL with $LTA_c$ | 3.071406836 | $TU_a$ | LC50 = | 32.558370 | % |

Rounded LC50's %
LC50 = 31 %
LC50 = 33

## Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

$\delta^2$ = 0.3074847

$\delta$ = 0.554513029

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB

(P. 100, step 2b of TSD)

$\delta_4^2$ = 0.086177696

$\delta_4$ = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC

(P. 100, step 4a of TSD)

$\delta^2$ = 0.3074847

$\delta$ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

$\delta_n^2$ = 0.3074847

$\delta_n$ = 0.554513029

D = 0.889296658

eD = 2.433417525

| | Vertebrate $IC_{25}$ Data or $LC_{50}$ Data | LN of data | | Invertebrate $IC_{25}$ Data or $LC_{50}$ Data | LN of data |
|---|---|---|---|---|---|
| | ********** | | | ********** | |
| 1 | 0 | | 1 | 0 | |
| 2 | | | 2 | | |
| 3 | | | 3 | | |
| 4 | | | 4 | | |
| 5 | | | 5 | | |
| 6 | | | 6 | | |
| 7 | | | 7 | | |
| 8 | | | 8 | | |
| 9 | | | 9 | | |
| 10 | | | 10 | | |
| 11 | | | 11 | | |
| 12 | | | 12 | | |
| 13 | | | 13 | | |
| 14 | | | 14 | | |
| 15 | | | 15 | | |
| 16 | | | 16 | | |
| 17 | | | 17 | | |
| 18 | | | 18 | | |
| 19 | | | 19 | | |
| 20 | | | 20 | | |
| St Dev | NEED DATA | NEED DATA | St Dev | NEED DATA | NEED DATA |
| Mean | 0 | 0 | Mean | 0 | 0 |
| Variance | 0 | 0.000000 | Variance | 0 | 0.000000 |
| CV | 0 | | CV | 0 | |

## Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute $LC_{50}$, since the ACR divides the $LC_{50}$ by the NOEC. $LC_{50}$'s >100% should not be used.

**Table 1. ACR using Vertebrate data**

| Set # | $LC_{50}$ | NOEC | Test ACR | Logarithm | Geomean | Antilog | ACR to Use |
|---|---|---|---|---|---|---|---|
| 1 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 2 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 3 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 4 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 5 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 6 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 7 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 8 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 9 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 10 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | NO DATA |
| | | | | ACR for vertebrate data: | | | 0 |

| | | |
|---|---|---|
| Table 1. Result: | Vertebrate ACR | 0 |
| Table 2. Result: | Invertebrate ACR | 0 |
| | Lowest ACR | Default to 10 |

**Table 2. ACR using Invertebrate data**

| Set # | $LC_{50}$ | NOEC | Test ACR | Logarithm | Geomean | Antilog | ACR to Use |
|---|---|---|---|---|---|---|---|
| 1 | #N/A | 37 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 2 | #N/A | 37 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 3 | #N/A | 37 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 4 | #N/A | 100 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 5 | #N/A | 100 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 6 | #N/A | 100 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 7 | #N/A | 100 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 8 | #N/A | 100 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 9 | #N/A | 50 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| 10 | #N/A | 25 | #N/A | #N/A | #N/A | #N/A | NO DATA |
| | | | | ACR for vertebrate data: | | | 0 |

**DILUTION SERIES TO RECOMMEND**

**Table 4.**

| | Monitoring | | Limit | |
|---|---|---|---|---|
| | % Effluent | TUc | % Effluent | TUc |
| Dilution series based on data mean | 7.9 | 12.62178 | | |
| Dilution series to use for limit | | | 4 | 25 |
| Dilution factor to recommend: | 0.2814749 | | 0.2 | |
| Dilution series to recommend: | 100.0 | 1.00 | 100.0 | 1.00 |
| | 28.1 | 3.55 | 20.0 | 5.00 |
| | 7.9 | 12.62 | 4.0 | 25.00 |
| | 2.2 | 44.84 | 0.8 | 125.00 |
| | 0.63 | 159.31 | 0.2 | 625.00 |
| Extra dilutions if needed | 0.18 | 565.98 | 0.0 | 3125.00 |
| | 0.05 | 2010.77 | 0.0 | 15625.00 |

**Convert $LC_{50}$'s and NOEC's to Chronic TU's for use in WLA.EXE**

**Table 3.** ACR used: 10

| | Enter $LC_{50}$ | TUc | Enter NOEC | TUc |
|---|---|---|---|---|
| 1 | | NO DATA | | NO DATA |
| 2 | | NO DATA | | NO DATA |
| 3 | | NO DATA | | NO DATA |
| 4 | | NO DATA | | NO DATA |
| 5 | | NO DATA | | NO DATA |
| 6 | | NO DATA | | NO DATA |
| 7 | | NO DATA | | NO DATA |
| 8 | | NO DATA | | NO DATA |
| 9 | | NO DATA | | NO DATA |
| 10 | | NO DATA | | NO DATA |
| 11 | | NO DATA | | NO DATA |
| 12 | | NO DATA | | NO DATA |
| 13 | | NO DATA | | NO DATA |
| 14 | | NO DATA | | NO DATA |
| 15 | | NO DATA | | NO DATA |
| 16 | | NO DATA | | NO DATA |
| 17 | | NO DATA | | NO DATA |
| 18 | | NO DATA | | NO DATA |
| 19 | | NO DATA | | NO DATA |
| 20 | | NO DATA | | NO DATA |

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here: NO DATA %$LC_{50}$ NO DATA TUa

**Cell:** I9
**Comment:**
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

**Cell:** K18
**Comment:** This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

**Cell:** J22
**Comment:** Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

**Cell:** C40
**Comment:**
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

**Cell:** C41
**Comment:** If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

**Cell:** L48
**Comment:**
See Row 151 for the appropriate dilution series to use for these NOEC's

**Cell:** G62
**Comment:**
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

**Cell:** J62
**Comment:**
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

**Cell:** C117
**Comment:** Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

**Cell:** M119
**Comment:** The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

**Cell:** M121
**Comment:** If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

**Cell:** C138
**Comment:** Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

2/5/2015 9:18:42 AM

Facility = GP Big Island (Outfall 003)
Chemical = Whole Effluent Toxicity (T.U.)
Chronic averaging period = 4
WLAa = 33
WLAc = 21
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

# observations = 1
Expected Value = 100
Variance = 3600
C.V. = 0.6
97th percentile daily values = 243.341
97th percentile 4 day average = 166.379
97th percentile 30 day average= 120.605
# < Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 30.7140704651179
Average Weekly limit = 30.7140704651179
Average Monthly LImit = 30.7140704651179

The data are:

100

# Attachment L

# NPDES Permit Rating Worksheet

# NPDES PERMIT RATING WORK SHEET

NPDES NO. VA0003026

☐ Regular Addition
☐ DiscretionaryAddition
☐ Score change, but no status change
☐ Deletion

Facility Name: **GP Big Island, LLC**

City: Big Island

Receiving Water: James River; Reed Creek, UT; Thomas Mill Creek, UT

Reach Number:

*Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?*
1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's 7Q10 flow rate

☐ YES; score is 600 (stop here) ■ NO (continue)

*Is this permit for a municipal separate storm sewer serving a population greater than 100,000?*

☐ YES; score is 700 (stop here)
■ NO (continue)

## FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: _____ Primary SIC Code: 2631 Other SIC Codes: 4911, 4952, 4953
Industrial Subcategory Code: 2, 21 (Code 000 if no subcategory)

*Determine the Toxicity potential from Appendix A. Be sure to use the TOTAL toxicity potential column and check one)*

| Toxicity Group | Code | Points | Toxicity Group | Code | Points | Toxicity Group | Code | Points |
|---|---|---|---|---|---|---|---|---|
| ☐ No process waste streams | 0 | 0 | ☐ 3. | 3 | 15 | ☐ 7. | 7 | 35 |
| ☐ 1. | 1 | 5 | ☐ 4. | 4 | 20 | ☐ 8. | 8 | 40 |
| ☐ 2. | 2 | 10 | ☐ 5. | 5 | 25 | ☐ 9. | 9 | 45 |
| | | | ■ 6. | 6 | 30 | ☐ 10. | 10 | 50 |

Code Number Checked: 6

**Total Points Factor 1:** 30

## FACTOR 2: Flow/Stream Flow Volume (*Complete either Section A or Section B; check only one)*

Section A ☐ Wastewater Flow Only Considered

| Wastewater Type (See Instructions) | | Code | Points |
|---|---|---|---|
| Type I: Flow < 5 MGD | ☐ | 11 | 0 |
| Flow 5 to 10 MGD | ☐ | 12 | 10 |
| Flow > 10 to 50 MGD | ☐ | 13 | 20 |
| Flow > 50 MGD | ☐ | 14 | 30 |
| Type II: Flow < 1 MGD | ☐ | 21 | 10 |
| Flow 1 to 5 MGD | ☐ | 22 | 20 |
| Flow > 5 to 10 MGD | ☐ | 23 | 30 |
| Flow > 10 MGD | ☐ | 24 | 50 |
| Type III: Flow < 1 MGD | ☐ | 31 | 0 |
| Flow 1 to 5 MGD | ☐ | 32 | 10 |
| Flow > 5 to 10 MGD | ☐ | 33 | 20 |
| Flow > 10 MGD | ☐ | 34 | 30 |

Section B ☐ Wastewater and Stream Flow Considered

| Wastewater Type (See Instructions) | Percent of instream Wastewater Concentration at Receiving Stream Low Flow | | Code | Points |
|---|---|---|---|---|
| Type I/III: | < 10 % | ☐ | 41 | 0 |
| | 10 % to < 50 % | ☐ | 42 | 10 |
| | > 50 % | ☐ | 43 | 20 |
| Type II: | < 10 % | ■ | 51 | 0 |
| | 10 % to <50 % | ☐ | 52 | 20 |
| | > 50 % | ☐ | 53 | 30 |

Code Checked from Section A or B: 51
**Total Points Factor 2:** 0

**FACTOR 3: Conventional Pollutants**
*(only when limited by the permit)*

NPDES NO: VA0003026

A. Oxygen Demanding Pollutant: (check one) ☒ BOD ☐ COD ☐ Other:_____

| Permit Limits: (check one) | | *Code* | *Points* |
|---|---|---|---|
| | < 100 lbs/day | 1 | 0 |
| | 100 to 1000 lbs/day | 2 | 5 |
| | > 1000 to 3000 lbs/day | 3 | 15 |
| ☒ | > 3000 lbs/day | 4 | 20 |

Code Checked: _4__

**Points Scored:** _20___

B. Total Suspended Solids (TSS)

| Permit Limits: (check one) | | *Code* | *Points* |
|---|---|---|---|
| | < 100 lbs/day | 1 | 0 |
| | 100 to 1000 lbs/day | 2 | 5 |
| | > 1000 to 5000 lbs/day | 3 | 15 |
| ☒ | > 5000 lbs/day | 4 | 20 |

Code Checked: __4__

**Points Scored:** __20__

C. Nitrogen Pollutant: (check one) ☐ Ammonia ☐ Other: _____

| Permit Limits: (check one) | | *Nitrogen Equivalent* | *Code* | *Points* |
|---|---|---|---|---|
| | < 300 lbs/day | | 1 | 0 |
| | 300 to 1000 lbs/day | | 2 | 5 |
| | > 1000 to 3000 lbs/day | | 3 | 15 |
| | > 3000 lbs/day | | 4 | 20 |

Code Checked: __NA_

**Points Scored:** __0__

**Total Points Factor 3:** __40__

## FACTOR 4: Public Health Impact

*Is there a public drinking water supply located within 50 miles downstream of the effluent discharge (this includes any body of water to which the receiving water is a tributary)? A public drinking water supply may include infiltration galleries, or other methods of conveyance that ultimately get water from the above referenced supply.*

☒ YES (If yes, check toxicity potential number below)

☐ NO (If no, go to Factor 5)

Determine the *human health* toxicity potential from Appendix A. Use the same SIC code and subcategory reference as in Factor 1. (Be sure to use the human health toxicity group column ☐ check one below)

| Toxicity Group | Code | Points | Toxicity Group | Code | Points | Toxicity Group | Code | Points |
|---|---|---|---|---|---|---|---|---|
| ☐ No process waste streams | 0 | 0 | ☐ 3. | 3 | 0 | ☐ 7. | 7 | 15 |
| ☐ 1. | 1 | 0 | ☐ 4. | 4 | 0 | ☐ 8. | 8 | 20 |
| ☒ 2. | 2 | 0 | ☐ 5. | 5 | 5 | ☐ 9. | 9 | 25 |
| | | | ☐ 6. | 6 | 10 | ☐ 10. | 10 | 30 |

Code Number Checked: _2_

**Total Points Factor 4:** _0

## FACTOR 5: Water Quality Factors

NPDES NO. VA0003026

A. *Is (or will) one or more of the effluent discharge limits based on water quality factors of the receiving stream (rather than technology-based federal effluent guidelines, or technology-based state effluent guidelines), or has a wasteload allocation been assigned to the discharge:*

| | | Code | Points |
|---|---|---|---|
| ☒ | Yes | 1 | 10 |
| ☐ | No | 2 | 0 |

B. *Is the receiving water in compliance with applicable water quality standards for pollutants that are water quality limited in the permit?*

| | | Code | Points |
|---|---|---|---|
| ☒ | Yes | 1 | 0 |
| ☐ | No | 2 | 5 |

C. *Does the effluent discharged from this facility exhibit the reasonable potential to violate water quality standards due to whole effluent toxicity?*

| | | Code | Points |
|---|---|---|---|
| ☒ | Yes | 1 | 10 |
| ☐ | No | 2 | 0 |

Code Number Checked: A 1 B 1_ C 1_

**Points Factor 5:** A 10 + B 0 + C 10 = 20 TOTAL

## FACTOR 6: Proximity to Near Coastal Waters

A. *Base Score: Enter flow code here (from Factor 2):* 51 *Enter the multiplication factor that corresponds to the flow code:* 0.10

Check appropriate facility HPRI Code (from PCS):

| | *HPRI#* | *Code* | *HPRI Score* |
|---|---|---|---|
| ☐ | 1 | 1 | 20 |
| ☐ | 2 | 2 | 0 |
| ☐ | 3 | 3 | 30 |
| ☒ | 4 | 4 | 0 |
| ☐ | 5 | 5 | 20 |

HPRI code checked: ___

| *Flow Code* | *Multiplication Factor* |
|---|---|
| 11, 31, or 41 | 0.00 |
| 12, 32, or 42 | 0.05 |
| 13, 33, or 43 | 0.10 |
| 14 or 34 | 0.15 |
| 21 or 51 | 0.10 |
| 22 or 52 | 0.30 |
| 23 or 53 | 0.60 |
| 24 | 1.00 |

Base Score: (HPRI Score) 0 X (Multiplication Factor) 0.1 = 0 (TOTAL POINTS)

B. *Additional Points ☐ NEP Program*
*For a facility that has an HPRI code of 3, does the facility discharge to one of the estuaries enrolled in the National Estuary Protection (NEP) program (see instructions) or the Chesapeake Bay?*

| | | Code | Points |
|---|---|---|---|
| ☐ | Yes | 1 | 10 |
| ☒ | No | 2 | 0 |

C. *Additional Points ☐ Great Lakes Area of Concern*
*For a facility that has an HPRI code of 5, does the facility discharge any of the pollutants of concern into one of the Great Lakes' 31 areas of concern (see Instructions)*

| | | Code | Points |
|---|---|---|---|
| ☐ | Yes | 1 | 10 |
| ☒ | No | 2 | 0 |

Code Number Checked: A 4 B 2 C 2_

**Points Factor 6:** A 0 + B 0 + C 0 = 0 TOTAL

**SCORE SUMMARY**

NPDES NO. VA0003026

| Factor | Description | Total Points |
|---|---|---|
| 1 | Toxic Pollutant Potential | 30 |
| 2 | Flows/Streamflow Volume | 0 |
| 3 | Conventional Pollutants | 40 |
| 4 | Public Health Impacts | 0 |
| 5 | Water Quality Factors | 20 |
| 6 | Proximity to Near Coastal Waters | 0 |
| | TOTAL (Factors 1 through 6) | 90 |

S1. Is the total score equal to or greater than 80? ☒ Yes (Facility is a major) ☐ No

S2. If the answer to the above questions is no, would you like this facility to be a discretionary major? NA

☐ No

☐ Yes (Add 500 points to the above score and provide reason below:

Reason:

NEW SCORE: 90

OLD SCORE: 90

Becky L. France
Permit Reviewer's Name

(540 ) 562-6700
Phone Number

1/21/15
Date

# Attachment M

# Public Notice and Comments

## France, Becky (DEQ)

**From:** France, Becky (DEQ)
**Sent:** Monday, March 30, 2015 11:03 AM
**To:** 'Pierce, Tim H.'
**Subject:** Response to Draft Permit Comments for GP Big Island and Revised Draft Permit
**Attachments:** Fact Sheet GP 2015 12 0330 2.docx; Response to Draft Comments to GP Big Island.docx; Permit Part I and II GP Big Island template 2015 17 033015.docx

I have attached my responses to the draft permit comments. All the revisions that are in agreement to your requests are noted in green under my comments. Your comments about Part I.C.25 included a request for 1 year to prepare a TMDL Action Plan. In my response I have given you 7 months (February 10, 2018) to submit the nutrient loading report and the Chesapeake Bay Action Plan (if required). These nutrient data submission(s) will not be due until about 2.9 years from the reissuance of the permit.

*Becky L. France*
*Water Permit Writer*
*Department of Environmental Quality*
*3019 Peters Creek Road*
*Roanoke, VA 24019*
*(540) 562-6793*
**E-mail:** Becky.France@deq.virginia.gov
**Web:** http://www.deq.virginia.gov

## France, Becky (DEQ)

**From:** Pierce, Tim H. [THPIERCE@GAPAC.com]
**Sent:** Friday, March 27, 2015 3:07 PM
**To:** France, Becky (DEQ)
**Subject:** VPDES Permit Renewal Comments
**Attachments:** VA0003026 draft comments March 2015 rev1.docx

Hey Becky,
Attached are comments to the permit and the fact sheet that we are submitting for your review. Please contact me if you would like to discuss or need any additional information. Thanks,
Tim

We appreciate the opportunity to provide comments on the draft permit and fact sheet. This letter provides our comments.

Permit Comments:

Page 8, Part I.B.1., we request that the 2nd sentence be changed to specify when the "effluent" flow rather than the "influent" flow is greater than 0.040 MGD. Fixed

Page 8, Part I.B.5., it is unclear what the asterisk adjacent to the E. coli limit represents. Removed

Page 11, Part I.C.7., please change the last paragraph as follows: Fixed

> Current: "No later than 14 calendar days following closure completion the DEQ shall submit to the DEQ Blue Ridge Regional Office written notification of the closure completion date and a certification of closure in accordance with the approved plan".
>
> Proposed: "No later than 14 calendar days following closure completion the permittee shall submit to the DEQ Blue Ridge Regional Office written notification of the closure completion date and a certification of closure in accordance with the approved plan".

Page 13, Part I.C.11.d., we request removal of the second sentence, "List type and quantity of wastes, fluids, and pollutants (e.g. chemicals) stored at this facility", since maintaining a current listing of every fluid on site would be extremely onerous and do little to improve current procedures. Removed

Page 15, Part I.C.15., we request the insertion of a clarification at the beginning of the section to specify that, "If the facility meets the applicability requirements stated in 40 CFR 125.91(a), then the permittee shall submit to the DEQ Blue Ridge Office by **October 3, 2019**, all applicable information described in 40 CFR§122.21(r)2 through 8 as follows:" Added

Page 24, Part I.C.a., we request that the four samples required for the specified data analysis be taken during the permit term rather than using the permit application data. This request is to allow the facility time to try to understand what additional Best Management Practices might be appropriate as we do not add fertilizers and do not know what may be contributing to the runoff. Added. You may want to look at application data and existing BMPs before beginning the 4 sampling events. For the application data, you reported construction activities may have contributed to high pollutant concentrations at one outfall and mowing may have contributed high pollutant concentrations at two outfalls. Stormwater sampling should be done during standard operating conditions.

Page 24, Part I.C.b., we request that for reason listed in the comment for Part 1.C.a. that the date for submission of the data analysis report be changed to July 10, 2018.

Page 25, Part I.C.c., we request that the date for submission of the Chesapeake Bay TMDL Action Plan be changed to July 10, 2018. I agree that additional time may be given for the submission of the monitoring report and potentially the Chesapeake Bay TMDL Action Plan. While there may be some problems with some of the data in the application, it can be used as an initial screening for BP Big Island to plan ahead. You may also evaluate the data and consider options as the data is being collected. The stormwater general permit allows only 90 days for submission of the plan. However, given the number of outfalls and complexity of the facility, 7 months following the last data collection deadline will allow time for completion of a report. In the event that the last stormwater sampling event occurs prior to the end of the monitoring period (June 30, 2017), the permittee may have over 7 months to complete the report. The implementation of the plan will be conducted over considerable time, and the plan may be revised along the way if needed. The date for the completion of the nutrient and sediment reductions was listed incorrectly in one part of the special condition and this typo has been corrected so that the date in June 30, 2024 for both instances.

Page 30, Part I.E.1.d., the evaluation period for the first annual period should be specified to commence at the permit issuance date with final permit sampling requirements adjusted accordingly. Fixed

Page 1, Part II.A.3., we request that this requirement be removed as it would impair the facility's ability to perform predictive monitoring, by testing for non-regulated parameters such as COD, BOD1, grab TSS samples, etc. Not being able to conduct such additional sampling at the outfalls increases the risk that potential non-compliance would not be detected as quickly as otherwise possible by running these shorter duration tests. I understand that it you want to collect a sample at outfall 003 to analyze for COD (which is not required for this outfall) to obtain process control information, the permit should not prohibit you from collecting the sample.

Removed as requested and reworded as follows…. Operational or process control samples or measurements not required by the permit monitoring requirements do not need to follow procedures approved under Title 40 Code of Federal Regulations Part 136 or be analyzed…

Fact Sheet Comments:

Page 6, Auxiliary Services, the three boilers listed should be changed from "Nos. 4, 5, and 6" to "Nos. 5, 6, and 7". Revised as requested

Page 6, Auxiliary Services: Water Treatment, we request that the following changes be made to the 2nd paragraph: Revised both sentence 1 and 3 as requested

> Current 1st sentence: "Raw river water flows through a rotary coarse trommel screen prior to entering a water clarifier.
>
> Proposed 1st sentence: "Raw river water may flow through a rotary coarse trommel screen prior to entering a water clarifier".
>
> Current 3rd sentence: "The water is then treated with aluminum sulfate and sodium hydroxide, and the treated water is stored in the north filter tank".

Proposed 3rd sentence: "The water is then treated with sodium hydroxide and may be treated with aluminum sulfate, and the treated water is stored in the north filter tank".

Page 7, **B. Industrial Wastewater Treatment**, Equalization Basins, we request that the following changes be made to the referenced section: Revised as requested

Current 4th sentence: "The effluent from the power area bypasses the primary clarifier and also flows to these basins".

Proposed 4th sentence: "The effluent from the power area may flow to the primary clarifier or to these basins".

Also, we request the following addition to the end of the Equalization Basins section: "As an alternative operating scenario, wastewater may be sent directly to the aeration basins and not through the equalization basins".

Page 8, **B. Industrial Wastewater Treatment**, Aeration Basin and Secondary Clarifier, we request that the reference to "leachate from the closed mill landfill (Bedford Landfill)" be removed as this landfill has completed post-closure care and no longer produces leachate. Revised as requested.

Page 9, **C. Outfalls**, we request that the following changes be made to the 1st paragraph of the Outfall 003 section: Revised as requested

Current 3rd sentence: "Outfall 003 is primarily comprised of process water from the pulping and paper manufacturing operations, leachate from two industrial landfill, backwash water from the water treatment process, and boiler ash sluice water".

Proposed 3rd sentence: "Outfall 003 is primarily comprised of process water from the pulping and paper manufacturing operations, leachate from one industrial landfill, backwash water from the water treatment process, and boiler ash sluice water".

Page 11, **C. Outfalls**, Outfalls 022, 023, 025, 028 (Industrial Landfill Outfalls), please remove Outfall 026 from the list of Sediment Basin Discharges as listed in the section. Revised as requested.

Page 11, **C. Outfalls**, Outfalls 022, 023, 025, 028 (Industrial Landfill Outfalls), please revise language from future tense to present tense in the 1st paragraph as follows: Revised as requested

Current 3rd sentence: "Another sediment basin at the Amherst Landfill will receive runoff from the new Phase III section of the landfill, and this runoff will be discharged to outfall 028".

Proposed 3rd sentence: "Another sediment basin at the Amherst Landfill receives runoff from the Phase III section of the landfill, and this runoff discharges to outfall 028".

Page 12, Section 12. **Material Storage**, we request that the reference to "fuel oil" be removed in the 1st paragraph: Revised as requested

Current 2nd sentence: "Process chemicals are stored in tanks outside the production areas and are associated with the black liquor/fuel oil tank farm, recovery area tank farm, water treatment area, No. 3 paper machine courtyard, linerboard mill tank farm, and wastewater chemical storage areas".

Proposed 2nd sentence: "Process chemicals are stored in tanks outside the production areas and are associated with the black liquor tank farm, recovery area tank farm, water treatment area, No. 3 paper machine courtyard, linerboard mill tank farm, and wastewater chemical storage areas".

Page 21, **Temperature, Heat Rejected**, please revise the 3rd paragraph as follows. Corrected

Current last sentence: "Since the cooling water discharge from outfall 001 has been eliminated, it is no longer necessary to report the heat rejected value as a calculated value from multiple outfalls on outfall 555".

Proposed last sentence: "Since the cooling water discharge from outfall 001 has been eliminated, it is no longer necessary to report the heat rejected value as a calculated value from multiple outfalls on outfall 999".

## France, Becky (DEQ)

**From:** Aschenbach, Ernie (DGIF)
**Sent:** Thursday, March 26, 2015 11:26 AM
**To:** France, Becky (DEQ)
**Cc:** ProjectReview (DGIF); Cason, Gladys (DGIF); Watson, Brian (DGIF)
**Subject:** RE: ESSLog# 30939; DEQ VPDES permit# VA0003026 reissuance for the GP Big Island, LLC In Big Island, Virginia

OK. We will add this to our records. Thank you for clarifying.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
P.O. Box 11104
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

---

**From:** France, Becky (DEQ)
**Sent:** Thursday, March 26, 2015 11:24 AM
**To:** Aschenbach, Ernie (DGIF)
**Subject:** RE: ESSLog# 30939; DEQ VPDES permit# VA0003026 reissuance for the GP Big Island, LLC In Big Island, Virginia

Thank you for your comments of the draft permit for GP Big Island. I noticed that you referred to outfall 002 and outfall 003 as internal outfalls. These outfalls discharge directly to the receiving stream and are therefore not internal outfalls. Outfall 999 is an outfall used to report calculated results from the test results of two outfalls and is not a specific discharge point.

The ammonia data from the application were very low and the statistical evaluation of the data does not indicate a potential to exceed the ammonia standards. Therefore, ammonia limits were included in the permit. Given the residence time and the small volume of chlorinated effluent from outfall 301 to the industrial treatment system, it is not believed that the discharge from outfall 003 will have a chlorine residual. Therefore, chlorine disinfection of outfall 301 (with alternative disinfection allowed) has been continued in the permit.

---

**From:** Aschenbach, Ernie (DGIF)
**Sent:** Tuesday, March 24, 2015 11:53 AM
**To:** France, Becky (DEQ); nhreview (DCR); Hillman, Brett
**Cc:** ProjectReview (DGIF); Cason, Gladys (DGIF); Watson, Brian (DGIF)
**Subject:** ESSLog# 30939; DEQ VPDES permit# VA0003026 reissuance for the GP Big Island, LLC In Big Island, Virginia
**Importance:** High

We have reviewed the VPDES permit# VA0003026 reissuance for the GP Big Island, LLC in Big Island, Virginia. According to our records, the following changes to the existing effluent characteristics and monitoring were made during the 2010 reissuance:

- **Outfalls number 001 and 002** will no longer discharge chlorine as a component of the non-contact cooling water. Therefore, the applicant requested the removal of monitoring requirements for Total Residual Chlorine (TRC). The applicant requested the thermal monitoring frequency be reduced from 5 times per week to 3 times per week, based on a consistent record of no exceedances for a period of 2-years.
- **Outfall number 003.** The applicant requested the effluent monitoring frequency (of Biological Oxygen Demand {BOD} and Total Suspended Solids {TSS}) be reduced from 5 times per week to 1 time per week, based on a

consistent record of no exceedances for a period of 2-years. Chlorine will still be used to treat sanitary wastewater.

In response to our comments for the 2010 VPDES reissuance, DEQ explained that the 2010 VPDES permit application included one datum for total residual chlorine, and the concentration was non-detectable (<0.0051 mg/L). The design capacity for the sanitary discharge is 40,000 gpd, and this discharge (outfall 301) flows into the industrial treatment system and then to outfall 003. The application lists the 30-day maximum average flow from outfall 003 as 8.76 MGD. The receiving stream (James River) has a 1Q10 low flow of 239 MGD. DEQ felt that, given the large amount of process water mixing with the chlorinated sanitary discharge, the residence time in the industrial treatment system, and the receiving stream flow, it is not believed that there is a potential for a chlorine residual in the discharge to outfall 003. Therefore, a chlorine limit was not included in the 2010 permit for outfall 003.

Our interpretation of the 2015 reissuance, "internal outfalls" #002 & #003 enter industrial treatment facility. Effluent from the industrial treatment facility is discharged from outfall 999. According to the effluent characteristics, the remainder of outfalls discharge untreated stormwater from the site.

According to our records, the state Threatened (ST) green floater and federal Species of Concern state Special Concern (FSSS) yellow lance mussels are known from the project area. This reach of the James River is a designated Threatened and Endangered (T&E) species water for the ST green floater. In order to protect the overall health of the aquatic resources, we reiterate our ongoing recommendation to use ultraviolet (UV) disinfection (rather than chlorination disinfection), if practicable. If chlorination becomes necessary and is used, we recommend dechlorination, prior to discharge. Freshwater mussels are known to be sensitive to ammonia. The ammonia limits within the 2013 EPA rule are the best information currently available regarding ammonia levels protective of mussels (not T&E mussels, any mussel species). Therefore, we recommend the EPA values being implemented in this permit for this and all future VPDES permits, if practicable. Provided adherence to the effluent characteristics and permit conditions, we do not anticipate the reissuance of this permit to result in adverse impact to resources under our purview.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend and support coordination with VDCR-DNH regarding the protection of these resources. We also recommend contacting the USFWS regarding species under their purview.

Thank you for the opportunity to provide comments.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

PUBLIC NOTICE – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater and stormwater into a water body in Bedford County, Virginia
PUBLIC COMMENT PERIOD: March 1, 2015 through March 30, 2015
PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater and stormwater issued by DEQ under the authority of the State Water Control Board
APPLICANT NAME, ADDRESS, AND PERMIT NUMBER: GP Big Island, LLC; PO Box 40, Big Island, VA 24526, VA0003026
FACILITY NAME AND LOCATION: GP Big Island, 9363 Lee Jackson Highway (U.S. Route 501), Big Island, Virginia 24014
PROJECT DESCRIPTION: GP Big Island, LLC has applied for a reissuance for a permit for the private GP Big Island facility in Big Island. The applicant proposed to release stormwater and an average of 14.35 million gallons per day of treated industrial wastewater. Sludge from the industrial treatment process will be disposed of by hauling to the facility's industrial landfill or to a composter. Sewage sludge will be disposed of by hauling to a municipal wastewater treatment facility. The facility proposed to release the treated industrial wastewaters and storm water into the following receiving streams which are in the Upper James River watershed (VAW-H01R). A watershed is the land area drained by a river and its incoming streams. The permit will limit pollutants to amounts that protect water quality: organic matter, solids, heat, and color. The draft permit includes requirements for cooling water structures.

| Receiving Streams | River Miles | Total Outfalls |
|---|---|---|
| James River | 277.57-278.89 | 13 |
| James River, UT | 0.12-0.34 | 2 |
| Thomas Mill Creek, UT | 0.28 | 1 |
| Reed Creek | 0.01 | 1 |

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if a public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.
CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION: Becky L. France; ADDRESS: Virginia Department of Environmental Quality, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; (540) 562-6700; E-MAIL ADDRESS: becky.france@deq.virginia.gov; FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above (by appointment) or may request copies of the documents from the contact person listed above.